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VIEWS, NEWS AND INTERVIEWS.

Thomas W. Cridler, Third Assistant Secretary of State and Special Commissioner of the United States to the Paris Exposition, accompanied by Col. L. M. Hamburger, assistant to the commissioner, and Lieut. A. C. Baker, United States Navy, attaché to the commission, sailed last Wednesday on the American Liner "New York" for Southampton, en route to Paris. They expect to stay six weeks. Mr. Cridler was appointed by the President to take the place of the late Special Commissioner Maj. Moses P. Handy, who died last month.

The Western Union Telegraph Company last week ordered a large force of newspaper telegraphers to Key West to handle news from Cuba. Seven men left New York city for the South, and three were sent from New York to Key West 10 days ago.

The masculine silk cocoon yields more silk than that of the feminine; hence, for raising purposes, such varieties as give more masculine eggs are by far preferable. Up to the present it was not easy to distinguish the masculine from the feminine cocoons; the distinction was solely based on the greater weight peculiar to the feminine cocoon. The X rays have greatly facilitated the distinction, observes a contemporary. On account of containing the unripe eggs, rich in mineral salts, the hind part of the feminine cocoon is found to be by far less transparent than that of the masculine. The dark shade in the vicinity of the ovary admits of readily recognizing the feminine silk chrysalis.

Sixteen thousand dollars is said to be the record price paid for a cablegram, that price having been paid for a message sent by Heniker Heaton to Australia in behalf of the British Parliament.

Charles H. Harris, one of the oldest telegraph operators on Long Island, died at his home in Jamaica on February 21 of peritonitis. He was 67 years old and was in charge of the Long Island Railroad station at Jamaica from 1854 to 1895. At one time he was the only telegraph operator on Long Island outside of Brooklyn.

At a small dinner given recently in a western city, says the New York *Sun*, the guest of honor was a young married woman who is the proud mother of two handsome boys, both under five years of age. In their education she endeavors to follow a system, after the manner of most young mothers, and is very particular to live up to any rule she has made for them.

During an early course in the dinner, and in the middle of an animated conversation with her host, she suddenly paused with a startled look and cried:

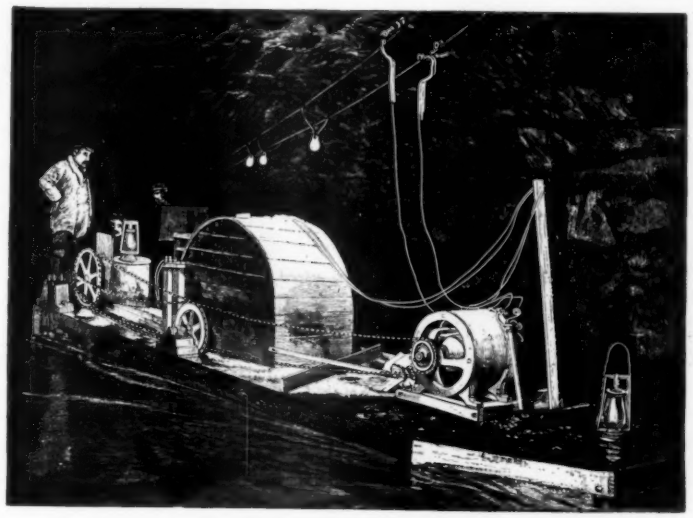
"There, if I did not forget those boys again! Have you a telephone in the house, and may I use it?"

She was taken to the telephone by her host, and the murmur of her voice in earnest conversation floated back to the dining-room. After a short pause she returned.

"I do hope you will pardon me," she said. "But, you see, I always have Georgie and Eddie say their prayers for me before they go to sleep. I forgot it to-night in the hurry of getting off, so I just called up their nurse. She brought them to the 'phone and they said their prayers over the wire, so my mind is relieved!"

All telegraph poles, numbering 500, between Mount Riga and Hillsdale, N. Y., on the Harlem road, were blown down during the severe storm on February 21. Trains were delayed several hours. One hundred linemen are repairing the damage.

About one year ago a syndicate of New York, San Francisco and Helena capitalists secured permission from Congress to dam the Missouri River at Cañon Ferry, near Helena, Mont., and work was begun at once. On February 19 the dam was flooded, and there is now being installed what is said to be, with the exception of the Niagara Falls plant, the most complete, as well as the largest, electrical plant in the country. Power will be furnished for two of Montana's largest concentrators, the East Helena smelter and the local street-car and lighting plants, and that will take only one-fourth of the power. While the dam was being flooded it necessarily left the river-bottom below dry, and several miners got out their gold pans and began active operations in the river-bed. In the 36 hours that it was dry some panned out as high as $100. Several companies will be formed to dredge the river-bottom.



AN ELECTRIC TOWBOAT IN A SEWER.

An Electric Towboat in a Sewer.

The city of Worcester, Mass., has a large sewer 18 feet wide and 13 feet high. The sewage of the city is treated chemically to render it fit to flow back into the Blackstone River, so that it is desirable to separate the storm water from the sewage to lessen the expense of the chemical treatment. In order to accomplish this end a smaller sewer, six feet wide and 4,000 feet long, is being built inside the larger one, utilizing the bottom and one of the sides of the sewer. A cofferdam is constructed to enable the other wall of the sewer to be built, and in order to deliver materials to the workmen an electric scow was rigged up, which has been found very satisfactory. Electricity is also used to light the sewer, to operate ventilating fans and to work electric pumps. All of the lighting and power are generated on the premises in a small building outside the sewer. About midway between the ends of the sewer a small dock has been constructed and the materials are delivered to it by an incline through a hole made in the top of one wall.

The towboat is a catamaran 22 feet long and 5 feet wide. Each of the small boats is 18 inches wide. In the middle of the catamaran is a small paddle-wheel box which is to prevent splashing. This is driven by means of sprocket wheels and chains which are connected with an electric motor of two and one-half horse-power. At the stern end is a rudder and controller, so that one man can operate both. Only one electric boat is used. It tows six scows, which have already handled 12,000 bricks, 50 barrels of cement and 100 barrels of sand daily. The double trolley system is used, the wires being hung from insulated brackets secured to the top of the arch in such a way that a trolley can be run on it. A scow is also fitted with a centrifugal pump which is used for pumping out the cofferdam, and it is driven by another motor of 14 horse-power. The application of the electric towage to sewer construction is novel, and the results obtained are most satisfactory.

The electric scow was designed by

Mr. Harrison P. Eddy, superintendent of sewers, Worcester, Mass. Mr. Robert N. Kendall is the assistant in charge of the electrical work. We are indebted to the *Scientific American* for the accompanying illustration and the above particulars.

A New Edition of "Standard Wiring."

Mr. H. C. Cushing, Jr., electrical inspector for the Fire Underwriters' Tariff Association, of New York, has just issued the 1898 edition of his hand-book, "Standard Wiring," for electric light and power, as adopted by the fire underwriters of the United States. This edition is entirely revised to date and contains the National Electrical Code, explained and illustrated with new and carefully prepared cuts of the latest requirements for dynamo and motor installations and wiring, together with all the necessary tables for inside and outside electric light and power wiring. This work has become the authority on wiring from an insurance inspector's standpoint, and its accuracy and simplicity will recommend it to all engineers, central station managers and contractors. The book will be sent postage free on receipt of its price, $1, by the ELECTRICAL REVIEW Publishing Company, Times Building, New York.

Kent Electric Manufacturing Company Burned Out.

The factory and stock of motors of the Kent Electric Manufacturing Company at Worcester, Mass., were destroyed by fire on February 18. The company at once secured temporary quarters and commenced work filling orders on hand. Mr. A. A. Kent, manager of the company, states that shipments will be caught up with in about two weeks.

A Fascinating Scheme for Extracting Gold.

TO THE EDITOR OF ELECTRICAL REVIEW:

In this neck of the woods even one can hear the march of progress. The particular footstep heard here might be taken as that of a crank chock full of "wheels," but the line of march pursued is striking enough to be mentioned, and without vouching for the truth or accuracy of the following, I give it as rumor puts it forth.

A party, by the name of Telfair, is said to be now in Atlanta making preparation for the active introduction of his "electrolytic mining process," the success of which he claims to have fully demonstrated heretofore, both in this country and in South Africa, having with it, so it is alleged, extracted many thousands of ounces of gold; of which and the apparatus used he was outrageously robbed.

His scheme is simplicity itself. He puts down two shafts into the earth to below the water-line, one shaft being in auriferous quartz. Both shafts are then allowed to fill more or less with seepage water from the surrounding mineralized rock, which is said to be then a good electrolyte.

Above ground a powerful dynamo is installed, its positive pole being connected to a big copper or other plate in the shaft first mentioned, and its negative pole to an amalgamated plate in the shaft, which is sunk in the gold-bearing rock. The remainder of the dynamo circuit is constituted by the earth between the bottoms of the shafts. The arrangement thus becomes a great electrolytic bath, and as soon as the dynamo is in motion and switch closed, the current proceeds to business, carefully and expeditiously picking out from the nooks and crannies and crevices and cracks of the auriferous rock all the free gold it carries, yanking the same along in a chain of golden "ions" and firing them continuously against the amalgamated cathode where they stick, as a matter of course.

Simple as A B C. All you have to do now is to bore holes in the earth with a diamond drill, put in your anode and cathode, connect them to the dynamo, and—"let her go Gallagher." No shafts costing $100 a foot, no mining, no blasting, no pumping or hoisting, or milling or concentrating or chlorinating. Only put down the holes, put in electrodes, start dynamo, and once a week or so saunter around, pull up the cathodes, scrape off the amalgam of gold and mercury and go to the mint.

Talk about your commercial earthquakes and revolutions! They're not in it with Telfair and his electrolytic mining outfit. And then you have one supreme advantage, the same as Artemas Ward claimed for "dry holes" in prospecting for oil; if you find the hole a dry one you can "pull it up, saw it off in lengths, and sell it for post-holes."

I wonder if, after all, there may not be a kernel of sense in what Telfair proposes? Yours,

MAC.

Murphy, N. C., January 30.

It is reported that the boom town of Texas City, Tex., which was recently sold in bulk at forced sale for $90,000, is to be revived, a company of Duluth and Texas capitalists having been formed with capital stock of $400,000 to complete a deep-water channel across Galveston Bay to Texas City, to erect an electric light and power plant, and to construct docks, street railways and grain elevators.

Nobe Pate is the unusual name of a builder of telephone lines at Hardinsburg, Ky.

De Veau & Company's New Factory.

On this page are shown interior views of the new factory of De Veau & Company, at 27 Rose street, New York. This company for years has been located at 32–34 Frankfort street; in fact, it is said to be the original telephone manufacturing company established in the independent field. The company was organized when the telephone first began to come into its general present use, and since that time the policy of its managers has been to produce telephone apparatus which should embody the best principles known to the art, in opposition to producing apparatus which in orginal cost might be cheaper, yet not so from a permanent standpoint. The equipments which this company has furnished during the past few months include a large number of the most modern exchanges in this and other countries, and also a large number of private inter-communicating systems. The interior instrument is a form of telephone apparatus to which this company has given much special study.

FIGS. 1 AND 2.—VIEWS IN THE NEW TELEPHONE FACTORY OF DE VEAU & COMPANY.

The illustrations give a general idea of the size of the assembling shops and other departments. The new factory has been equipped with the most modern machines for the production of all parts and details of telephone apparatus, and will rank as one of the most complete establishments of the kind in the country.

At the annual meeting of the Sandy Hill, N. Y., Electric Light and Power Company, the following were elected: President, Hon. J. H. Derby; vice-president, L. M. Howland; secretary, Frank Washburn; treasurer, J. E. Howland; directors, Hon. J. H. Derby, Frank Washburn, L. M. Howland, L. G. Fisher, J. E. Howland.

"AMERICAN" STOKERS AT THE CARNEGIE STEEL COMPANY'S PLANT.

ECONOMICAL RESULTS OF THEIR USE.

The steam generating plant recently installed in the Carnegie Steel Company's works at Pittsburgh is perhaps the largest and most complete equipment of the kind, from a point of economic production of power, of any yet consummated in this country and perhaps in the world.

The battery of boilers consists of 24 two-flue boilers with a diameter of 54 ins. by 28 feet, containing two 16-foot flues. The plant is now being

FIG. 1. — THE SIX SMOKELESS STACKS ARE OVER BOILERS FIRED BY "AMERICAN" STOKERS.

equipped with coal-conveying machinery, enabling eight boilers to be handled by one fireman. The nominal rating of these boilers is 43 horse-power each, but under tests 178 horse-power was developed from each boiler, and this when using the ordinary run of mine coal.

An important feature of the plant is the installation of stokers of the "American" type, made by the American Stoker Company, of Brooklyn, N. Y. These were accepted by the engineers only after the most exacting demonstrations of the efficacy both as to their intrinsic economy and their value in comparison to other types of stokers. The saving by the adoption of the apparatus in this plant in itself means a saving of 30 per cent in manual labor and the most perfect economy in fuel consumption. As mentioned, 178 horse-power each has been satisfactorily developed from these boilers of a nominal rating of 43 horse-power. This, in large part, is attributable to the "American" stoker system, which permits the entire consumption of the fuel, resulting, even with the cheapest grade of soft coal, in hardly a trace of soot or smoke at the stack, and consequently increasing to the highest point the boiler efficiency. Near this plant the Carnegie company are completing another battery of 14 Cahall B. & W. type of water-tube boilers, with which 28 additional "American" stokers are being placed.

A test, bearing on the advantage of this form of stoker, was made of three stokers by the Shoenberger Steel Company at Pittsburgh, which resulted in a further order for 13, which are now in operation. The illustration published herewith is one of a series taken at intervals of 12 minutes during the test, and shows the action of the stokers at the stacks. The six stacks which show no trace of smoke are over stokers of the "American" type; those stacks showing the heavy smoke are over stokers of other types. These tests were carried on by the engineers of the company, and the several boilers were under the same conditions; that is, as to fuel, time of feeding, etc.

American Institute of Electrical Engineers.

The 122d meeting of the Institute was held at 12 West Thirty-first street, February 23, and was called to order by President Crocker at 8.30 P. M. About 75 members and guests were present. A paper on the "Single-Phase Induction Motor" was read by Mr. Steinmetz and was discussed by Prof. W. S. Franklin, Dr. A. E. Kennelly, Messrs. E. E. Ries, Townsend Wolcott and others.

At the meeting of the executive committee in the afternoon, the following associate members were elected: Frank Broili, electrical engineer, California Electrical Works; residence, 823 Geary street, San Francisco, Cal. Samuel Byington Libby, superintendent New York & Staten Island Electric Company, West New Brighton, N. Y. Otto T. Louis, manager of New York branch, Queen & Company, incorporated; residence, 340 East 119th street, New York city. James A. Mortland, Professor of Physics, Faculty State Normal School, 2502 Walnut street, Cedar Falls, Iowa. Charles H. Schum, electrical engineer, Ideal Electric Corporation, 216 Third avenue, New York city. C. E. Sedgwick, agent at San Francisco office, General Electric Company, 15 First street; residence, Berkeley, Cal.

Mr. William Goltz, of Milwaukee, was transferred to full membership.

An Electric Heater Patent Decision.

TO THE EDITOR OF ELECTRICAL REVIEW:

In the Summer of 1895 the American Electric Heating Corporation took a contract with the West End Street Railroad, of Boston, to equip over 700 cars, supplying an exact copy of our electric heater, on the ground that our patent was not valid. Since that time they have equipped about 500 additional cars or more with our heater. They have advertised this fact.

Suit was brought against the West End Street Railroad, and defended by the American Electric Heating Corporation. August 25, 1897, Judge Putnam, of the United States Circuit Court for the District of Massachusetts, rendered a decision holding them to be infringers and sustaining the second claim of our patent, but denying the first on the ground of its identity with the second. Both sides appealed the case, we on the first claim. Together with the patent we send you a decision by the Circuit Court of Appeals broadly sustaining both claims of our patent.

Very truly yours,

CONSOLIDATED CAR-HEATING COMPANY,

By CHAS. T. SHELDON,

General Manager and Treasurer.

Albany, N. Y., February 24.

COMPARATIVE TRIALS ON THREE TWO-FLUE BOILERS AT THE SHOENBERGER STEEL COMPANY, PITTSBURGH, PA.

	Hand Fired.	Stoker Fired.	
		Economy.	Capacity.
Date	Dec. 1, 1896.	Feb. 18, 1897.	Feb. 19, 1897.
Duration of trial, hours	8	8	7
Heating surface, square feet	1,225	1,225	1,225
Kind of coal used	Pittsburgh. Run of Mine.	Pittsburgh. River Slack.	Pittsburgh. River Slack. Not Taken.
Refused, dry, per cent	12	9.49	
Water evaporated per pound of dry coal from and at 212 degrees, pounds	6.72	9.64	8.87
Horse-power developed	327.8	360.7	482.
Rating, horse-power	120.	120.	120.
Ratio of horse-power developed to rating	2.73	3.05	4.7
Heating surface per horse-power, square feet	3.72	3.34	2.7
Per cent increase of capacity by use of stoker		11.6	37.5
Per cent increase of evaporation per pound of coal		44.5	32.
Cost of evaporating 1,000 pounds of water, cents	4.87	2.85	3.11
Per cent of saving by the use of stoker		41.4	36.1

A Large Contract for the Walker Company.

The Brooklyn Elevated Railroad Company, of Brooklyn, N. Y., last week signed a contract with the Walker Company, of Cleveland, Ohio, to equip about 150 of its cars with Walker electric motors. At the same time a contract was made with the Sprague Electric Company, of New York city, to install the Sprague system of multiple control in connection with the Walker equipment. The Brooklyn Elevated company expects to run its cars from Brooklyn over the Bridge to the New York side, and hopes to have cars in operation across the Bridge by June 1. The Walker Company expects to complete its contract for motors before that time.

FIG. 2.—THE CARNEGIE STEEL COMPANY'S BOILER PLANT EQUIPPED WITH "AMERICAN" STOKERS.

TELEPHONE NEWS AND COMMENT.

At a meeting of the stockholders of the Ontario Telephone Company, of Oswego, N. Y., the following officers were elected: President, F. A. Emerick; vice-president, Robert Downey; secretary, E. B. Powell; treasurer, Robert G. Post; directors, T. P. Kingsford, Niel Gray, Jr., Charles H. Butler, James D. Henderson, F. A. Emerick, Robert G. Post, Robert Downey, Charles H. Bond, Swits Conde and James Dowdle.

At the annual meeting of the Central New York Telephone and Telegraph Company, Utica, N. Y., the following directors were elected: Warren H. Girvin, Martin A. Knapp, Lewis H. Lawrence, Charles A. Nicholson, David B. Parker, Robert S. Williams and Francis G. Wood. The officers elected were: President, R. S. Williams; vice-president, Lewis H. Lawrence; general manager, Charles A. Nicholson; secretary and treasurer, Francis G. Wood.

At the annual election of directors of the Troy, N. Y., Telephone and Telegraph Company the following officers were chosen: George P. Ide, William C. Humstone, Charles A. Tinker, William S. Earl, C. Jay French, Selden E. Marvin, C. H. Erwin, Alba M. Ide and James F. Cowee. Herbert S. Ide and F. A. Sim were chosen inspectors of election. The directors subsequently elected George P. Ide, president; William C. Humstone, vice-president; Alba M. Ide, second vice-president; Herbert J. Richmond, secretary and treasurer.

At the annual meeting of the stockholders of the Empire State Telephone and Telegraph Company, held at Auburn, N. Y., on February 21, the following directors were elected: Edward H. Avery, Henry L. Storke, Dexter A. Smith, Charles I. Avery, Fred E. Storke, George Underwood, David B. Parker, John D. Teller and Murray M. Storke. At a subsequent meeting of the directors the following officers were elected: Henry L. Storke, president and general manager; Dexter A. Smith, vice-president; Murray M. Storke, secretary; Charles I. Avery, treasurer; George A. Paddock, assistant general manager; C. A. Weeks, auditor. Executive Committee—Henry L. Storke, David B. Parker, Charles I. Avery.

A Telephone Patent Decision at Mobile.

On August 27, 1896, the Western Electric Company, of Chicago, filed a suit in equity in the United States Circuit Court against the Home Telephone Company, of Mobile, Ala., for an infringement of patent rights. On February 9, 1898, United States Judge Toulmin rendered his opinion in the case. The suit was brought by the Western Electric Company on patent No. 330,061, dated November 10, 1885, as the assignee of Charles E. Scribner, to whom the patent was granted, against the Home Telephone Company, Albert S. Lyons and Adam Glass. The patent covers improvements in multiple switchboards for central telephone exchanges. Originally it was charged that claims 2, 3, 4 and 6 of the Scribner patents were infringed, but on the hearing claim 3 was withdrawn from the charge.

In his opinion, Judge Toulmin stated that the patent in suit was a pioneer invention, and said that there was no conflict in the testimony as to the fact that the invention covered by the patent in suit and the apparatus in use by the defendant accomplished the same result. "But there is," said the Court, "a want of harmony in the conclusion of the witnesses on the conceded facts. There is a difference in their expert opinion whether the two devices are substantially identical and employ substantially the same means to obtain the result which it is stated is the same." The court finally decided that claims 2 and 4 had been infringed, but that the infringement of claim 6 had not been shown. The bill of complaint as against Messrs. Lyons and Glass individually was dismissed.

The court ordered that a decree be entered in accordance with the above, and also for an injunction and accounting of the profits and damages in respect to claims 2 and 4. The injunction was not to be operative until 60 days after the entry of the decree, on account of the public inconvenience that might result in summarily enjoining the defendant, the Home Telephone Company, in the use of its switchboards.

ITEMS OF INTEREST.

The Madison Street Railway Company, of Milwaukee, Wis., will soon be reorganized, with a capital of $75,000. Articles of incorporation for the company have already been filed.

The Englewood & Chicago, Ill., Electric Street Railroad has ceased to exist, the title being transferred to the Chicago Electric Traction Company. Officers of the latter company have been elected as follows: President, Jules S. Bache; vice-president, Samuel R. Shipley; treasurer, Henry Lewis; secretary, H. A. Hinsley.

The Davis & Egan Machine Tool Company, of Cincinnati, Ohio, have just received an order from their Copenhagen office for 11 machines, including lathes, milling machines, drill presses, screw machines, etc. They have also received an order for several lathes from St. Petersburg, Russia, and an order for three machines from Belgium.

The Rising Sun, Northeast & Elk Neck, Md., Electric Railway Company has elected the following officers: President, James Mallen; secretary and treasurer, George W. Cosden; manager, L. O. Cameron; directors, James Mallen, George W. Cosden, M. E. Kirk, E. E. Duyckinck, J. M. C. Carhart, Andrew Anderson, L. O. Cameron, Dr. Frank Mackie and William L. Mearns.

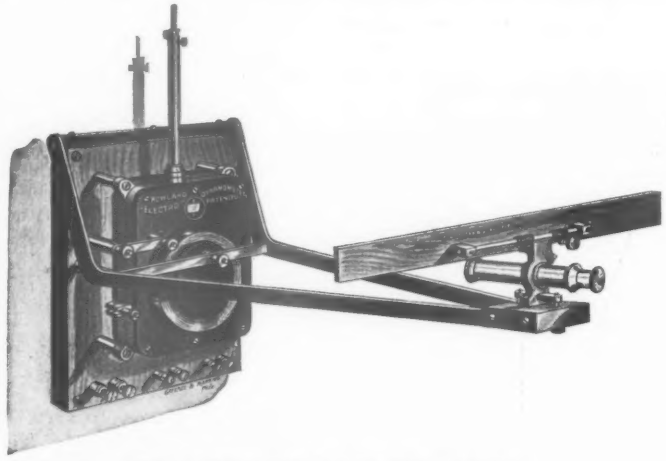


FIG. 1.—ROWLAND'S ELECTRO-DYNAMOMETER.

Some Important Apparatus of New Design.

The ELECTRICAL REVIEW has received from James G. Biddle, Drexel Building, Philadelphia, pamphlets containing descriptions and price-lists of some very interesting and novel instruments just put upon the market by Elmer G. Willyoung & Company, of Philadelphia, for whom Mr. Biddle acts as selling agent.

The most important of these instruments is, without a doubt, the new "electro-dynamometer" of Prof. H. A. Rowland, which has been announced for some time past. Broad patents were issued upon this instrument to Prof. Rowland several years ago, and since that time Prof. Rowland and the Willyoung company have both been steadily busied in its development. The respect in which the Rowland electro-dynamometer differs from all other electro-dynamometers heretofore made is that it is so designed as to be capable of use in alternating circuits with shunts of various values just as an ordinary galvanometer is when used with direct currents. Essentially the instrument consists of a very small movable coil of extremely small self-induction, arranged to be put in series with variable known and somewhat high values of non-inductive and capacityless resistance. This series combination is itself arranged to shunt around values of low non-inductive and capacityless resistance capable of carrying large currents. To quote from Prof. Rowland's own description printed in the pamphlet the instrument will measure the following: Alternating currents, from .0001 to 50 amperes; direct currents, from .00000001 to 50 amperes; volts, alternating or direct, from .005 to 500 or more; watts, from .001 to 25,000, with an immense variety of amperes and volts.

Self and mutual inductances and capacities, either directly or in absolute measure or by comparison with standard inductances or condensers, leakage and electric absorption of condensers, cables, etc., for any given alternating current or potential. The hysteresis of iron and losses under actual practical conditi.ns. Non-inductive resistances, such as liquid resistances, by a method about 1,000 times more sensitive than that based on the usual method of using the electro-dynamometer.

Alternating currents for use in physiological experiments, the measurements being about 100 times more sensitive than with the usual method of using the electro-dynamometer.

The instrument proper is shown in Fig. 1; it is very similar in general appearance to the now well known Rowland D'Arsonval galvanometer also manufactured by Willyoung & Company, and has its own telescope and scale permanently attached. The various accessory resistances and shunts are contained in the shunt box, Fig. 2. This shunt box is arranged with sets of switches numbered and lettered according to a diagram accompanying the instrument, so that its manipulation in obtaining the various results becomes simplicity itself.

The pamphlet referred to above contains a full description of the theory and use of the instrument written by Professor Rowland, together with diagrams and directions for its use in the practice of a considerable number of new methods devised by him and described also in the November, '97, number of *The American Journal of Science*, and the January, '98, number of the *L. & E. Philosophical Magazine*.

It is the belief that the instrument will meet with a large demand, and that it will be of great service in facilitating and stimulating the study of alternating-current phenomena.

Willyoung & Company have also just brought out Professor Northrup's "oscillating-current galvanometer" for Hertzian and resonance experiments and for the detection and comparison of high-frequency currents. A picture of the instrument is given in Fig. 3. According to Dr. Northrup's experiments, this instrument will replace the coherer, vacuum tube and similar devices to good advantage in much of the usual Hertzian and resonance work, as well as prove of great service in many experiments in telephone currents, wireless telegraph, etc.

The Willyoung high-potential transformer for producing resonance phenomena, Hertzian waves, vacuum tube, experiments, etc., is shown in Fig. 4. Every known experiment involving the use of oscillating currents, including Hertzian experiments on electric waves, Tesla's high-frequency experiments, Pupin's resonance experiments, X-ray and vacuum tube experiments, etc., can be best performed with the assistance of this piece of apparatus. While the transformer itself is somewhat costly and difficult to make, the subsidiary apparatus needed in the various experiments can in the main be "rigged up" on short notice and with slight expense; thus a physical laboratory, provided with a high-potential transformer, is equipped for a very great variety of experiments.

With the single exception of vacuum tube X-ray experiments where a unidirectional discharge is required, the high-potential transformer replaces and is in many ways superior to the induction coil. Its superiority rests upon the fact that the supply of energy from a transformer is continuous, while with an induction coil the supply of energy comes only at intervals, which are great compared with the actual time of supply.

The transformer is put up in a cherry box, highly polished. It is provided with a double discharge gap between balls, made of non-arcing metal. This gap is enclosed in a hard fibre box, so that the discharge is practically inaudible.

The object in making the discharge gap double is to make the oscillations, which will accrue in series with it, more forcible than they would be were the gap single. However, in some Hertzian experiments it is desirable for obtaining the best oscillations that the partial arc which forms across the discharge gaps should be forcibly blown out. This requirement is provided for; the glass windows upon opposite sides of one of the gaps unscrew. In the place of one of them a tube to which a rubber hose can be fastened is inserted. The air blast can then be given by a foot bellows or furnished by means of running water.

In working with the transformer it is often desirable to obtain the high potential and still have a small current flow in the circuit of the secondary of the transformer. The result is obtained by inserting a small condenser in the circuit. The cover of the transformer box is provided with three binding posts, between two of which such condensers may be inserted. Likewise resistances of inductance. The primary coils end in four binding posts, by means of which they may be connected up in series or multiple, according to the potential of the alternating circuit employed. The current in the primary can be cut down as desired by external inductive resistances. The insulation of the transformer is very high, so that a three-quarter-inch discharge can be drawn from its secondary without danger. It is so designed that the heating is insignificant and the current required very small. It must be understood, however, that if the secondary discharge is passing as an arc the secondary is practically short-circuited, and therefore the primary will take an undue current. It is always well, therefore, in using the transformer to have a condenser in series with its secondary. This condenser should have a capacity as great or greater than the condenser, which may be used in the outside circuit in series with the discharge gap. In this case there will be scarcely any arc formed in the discharge gap, and the length of the discharge between the balls will not be diminished.

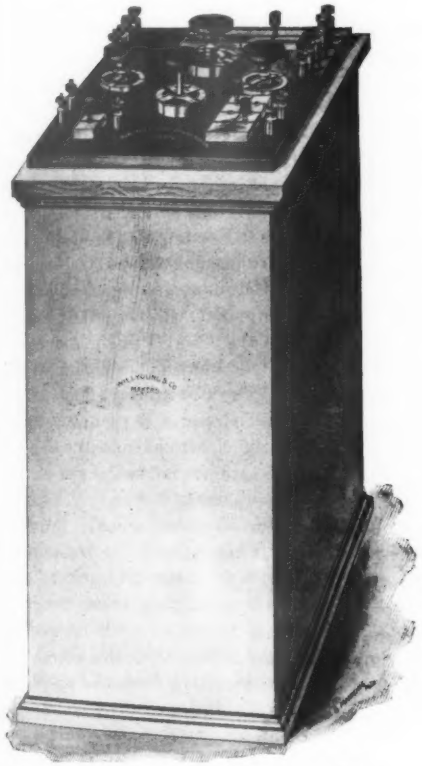


FIG. 2.—RESISTANCES AND SHUNTS FOR ROWLAND'S ELECTRO-DYNAMOMETER.

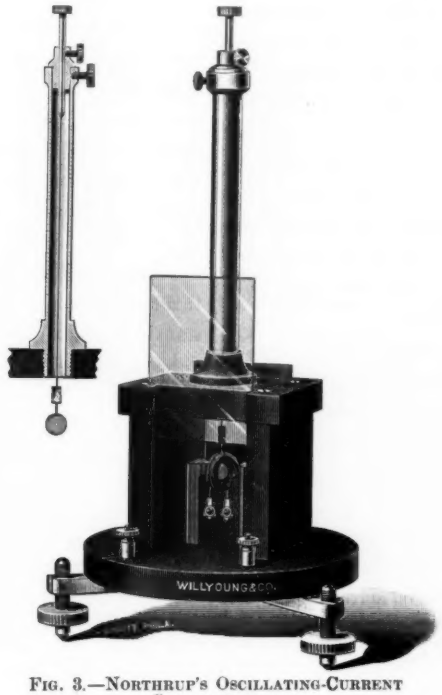


FIG. 3.—NORTHRUP'S OSCILLATING-CURRENT GALVANOMETER.

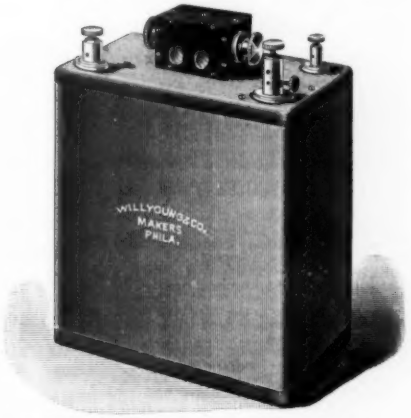


FIG. 4.—WILLYOUNG'S HIGH-POTENTIAL TRANSFORMER.

The complete wiring system, as established and standardized by the Interior Conduit and Insulation Company, will be installed exclusively in the new Park Row building, New York city, the largest office building in the world. Some 250,000 feet of Interior Conduit will be used in the installation, which will be made by the New York Electric Equipment Company. The Sprague high-speed vertical electric elevators will also be used in this building.

Electrical Review

[OLDEST ELECTRICAL WEEKLY IN THE UNITED STATES.]

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SPECIAL NOTICE TO ADVERTISERS.

CHANGES for advertisements must be in this office by Friday noon for the following week's issue.
NEW ADVERTISEMENTS should be in the office not later than Saturday noon to insure publication the following week.

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Newspaper despatches state that an English syndicate has closed a deal for the Ortiz grant, which embraces a number of gold placer properties in Santa Fé County, N. M. Thomas A. Edison is constructing on the grant a gold recovery plant which will handle 25,000 tons of placer dirt per day. Mr. Edison says that the agreement between himself and the owners of the property provides that he is to receive $1,500,000 if his system proves a success. Our opinion is that the English syndicate would better arrange at once to pay Mr. Edison his money. He will win it.

THE COMMONEST FELONY.

Disregard for the sanctity and obligation of oaths is so common in our courts of justice that scarcely a day passes that many of our judges do not note some instance of what they know to be perjury. Some of the leaders of the bench regard the evil as a growing one. It has been remarked that for every person convicted of the deliberate perjury which is a crime, and which is susceptible of legal proof, there are a hundred who escape because of the trouble of proving the offence to the satisfaction of the law. There are many witnesses, too, who swear falsely without intending it. Inexactness of memory, confused ideas as to the meaning of words, or the timidity into which the bullies and brow-beaters of the bar throw them, will often account for conflicting testimony when apparently perjury has entered it somewhere. Many cross-examiners proceed on the theory that no witness ever tells the exact truth if he can avoid it.

Whether the crime of perjury is or is not especially prevalent in Philadelphia we do not know. At any rate, the *Bulletin*, of that city, was recently moved to publish a long and interesting article on the question, in the course of which was considered another form of perjury often tolerated or encouraged outside of courts —the lying that prevails in cases for damages. The corporations of Philadelphia or the State, against which there may exist a popular prejudice, as well as the city government itself, have been the victims of it time and again. The passenger railway and railroad companies, especially the traction companies, have been mulcted of several millions of dollars, largely because of the evidence of perjurers, who think that a rich man or a corporation is fair game whenever it is possible to cook up against either, on any plausible pretext, a suit for damages. The grossest exaggeration, the meanest deceptions, the most barefaced of downright lying, all bolstered up by some miserable shyster who is to have a big percentage of the fruits of perjury, are unblushingly resorted to in such cases, and easily impose upon the minds of the jury. A few months ago Judge Wiltbank, just after he went on the bench, declaimed vigorously against the perjury which he had witnessed in a case for damages against the city, but it is not known that any one has been punished. Perhaps the Judge had not yet been seasoned to it like his older colleagues.

Favorable reports reach us from the different manufacturing and illuminating companies of the waning popularity of the Welsbach gas burner, as proved by the accounts of the illuminating companies in whose territories the mantle burner at first made some headway. Any customers which were lost are returning to the incandescent lamp, tired of the expense involved in renewing shattered mantles and worn out with the ghastliness of the light. Additional proof is furnished by the production and sales reports of the different manufacturing companies, which show a constantly increasing demand for incandescent lamps, as well as for arc lamps, especially those of the enclosed arc type. In stores, restaurants, cafés, hotels and halls where the Welsbach burner secured temporary success, the enclosed arc lamp is rapidly bringing back the use of electricity, while in new establishments the Welsbach burner is not finding much foothold.

The sale in New York last week of the wonderful and costly collection of ceramics made by the late Charles A. Dana, editor of *The Sun*, attracted collectors and lovers of art from all parts of the country. The collection brought in the neighborhood of $200,000, and was one of the most successful sales of the kind ever held. It is of interest to note that an electrical man secured the choice of the collection at the highest price paid for any single piece. This was the Du Barry vase, which was knocked down at $5,000 to Mr. Marsden J. Perry, of Providence, R. I., president of the Narragansett Electric Lighting Company. This vase is known to collectors the world over, and Mr. Perry was an object of envy as he passed out of the gallery with his purchase in his arms.

WALL STREET AND THE ELECTRICAL STOCK MARKET.

The dominating influence in the general stock market during the past week has been the fear that serious international complications might follow the "Maine" disaster. The apprehension over Cuban matters which began with the De Lome incident culminated on Thursday in the worst slump the New York Stock Exchange has seen since the Venezuelan panic. It is useless to attempt to give specific reasons for individual declines. Holders of stock simply became frightened, and gave orders to sell at any price. There is some evidence that a great many such stocks have passed from weak hands into strong ones, but the nervousness and uncertainty which have characterized the market for the last fortnight will not disappear until the Cuban question is settled.

General Electric was traded in to a moderate extent only. It touched 34¾ on Monday and declined to 30½ on Thursday, which was the low price of the week. The management reports no news of importance this week. The disturbing effects of the "Maine" troubles have not yet been felt in the electrical industry, and the run of orders is fully up to the average of recent weeks.

Of the traction stocks, Brooklyn Rapid Transit sold up to 42¾ on Monday and then declined to 36¾ on Friday, rallying from the latter figure at the close. Officials of the company report that the increase in receipts resulting from the operations on the Bridge exceeds the expectations of all but the most sanguine of the company's friends.

Western Union Telegraph, in common with the other stocks, was weak, and declined from 90¾ on Monday to 86¼ on Friday, the price rallying at the close. Some of the debenture 7's sold at 105½.

Edison Electric Illuminating of New York sold at 133. The bonds were quiet, the first 5's selling at 112 and the consolidated 5's at 116.

North American was steady on moderate transactions, quotations being 5⅛ to 5⅞. Application has been made to the New York Stock Exchange to list $603,000 additional consolidated mortgage 5 per cent gold bonds of the Milwaukee Electric and Light Company. American Telegraph and Cable reported sales of 50 shares at 92.

Philadelphia advices are that the Electric Storage Battery Company will show actual net profits for 1897

of over $300,000, as compared with $135,000 in 1896. The greatest volume of business was done in November and December.

Electrical shares on the Boston Exchange reflected the course of the general stock market, showing heavy losses during the week, with noteworthy reactions at the close. Bell Telephone opened at 265 on Monday, sold down to 247 Thursday, and back to 259 Friday, on sales of only 950 shares; General Electric preferred was bid 90, offered at 95; New England Telephone Monday sold at 131 and on Friday at 128, while Erie Telephone dropped two points to 68 on Thursday, closing at 68½.

Electric Storage Battery stocks were quiet. The common stock lost a point to 21 Friday, while the preferred was bid 24, offered at 25. Pennsylvania Heat, Light and Power, on sales of nearly 6,000 shares during the week, opened at 22¼, sold down to 20¼ and back to 21¾ on Saturday.

RAY.

Wall Street, February 26.

Newport Street Railway Company.

The management of the Newport Street Railway Company, Newport, R. I., has been changed. Mr. G. P. Magner has been elected general manager and Mr. A. E. Burland, superintendent. Mr. Burland is also superintendent of the Newport Illuminating Company, in which position he will still remain. He has been the means of building up the old Newport Illuminating Company, and through his efforts and hard work has made a first-class property of this concern. As the Newport Street Railway Company needs a good overhauling and building up, it undoubtedly accounts for the fact that he has been appointed superintendent, as the owners of the railway company know of the good work that he has been able to do in building up the illuminating company. Mr. Magner is general manager and treasurer of the Newport Illuminating Company, which position he will continue to fill.

Mr. Frank E. Colbert, for some time with the Terre Haute Car and Manufacturing Company and later with Mayer & Englund, Philadelphia, has taken charge of the Chicago office of the Miller-Knoblock Company, South Bend, Ind. Mr. Colbert's energy and enthusiasm in the electrical field make him a valuable acquisition to the company named and he is to be congratulated on becoming associated with such a representative concern.

George H. Atkinson Arrested.

George H. Atkinson, former manager of the Newark, N. J., Telephone Company, was arrested in Jersey City on February 23, in civil proceedings brought by Robert Baker, of Brooklyn, to recover 550 shares of stock of the Newark Telephone Company.

Baker alleges that in the latter part of March, 1896, he bought the stock from Atkinson at $10 a share, and left it with him in trust, taking Atkinson's receipt for it, and that when he demanded the stock Atkinson refused to surrender it. Atkinson was held in $5,000 bail. Another suit against Atkinson has been instituted by Alfred Hopkins and Theodore Coe, of Montclair, N. J. They claim $20,000 for their services in selling stock of the Newark Telephone Company and of the Hudson Telephone Company. They say that they agreed to accept stock of each company in lieu of cash commissions, and that the stock was voted to them by the directors, but Atkinson withheld it.

A Handsome Wire Catalogue.

The Safety Insulated Wire and Cable Company, of New York city, has just issued a very striking and unique catalogue of its well known wires and cables. The make-up and matter of the catalogue are of a high degree of excellence, and the indorsements of "Safety" insulation contained in the pages of this pamphlet are strong and of a convincing character. The cover design represents a reel of wire with a tag attached to it, the reproduction being very lifelike. Handsome half-tones scattered through the pages of the catalogue illustrate the uses of "Safety" wires and cables for telephone, telegraph, electric light, electric railway, underground, submarine and power transmission services. A number of valuable wire tables are also published.

National Electric Light Association.

The next meeting of the National Electric Light Association will be held at Chicago on June 7, 8 and 9, 1898. Headquarters will be established at the Auditorium Hotel, and the meetings will be held in the Auditorium Banquet Hall. The rates for accommodation at the Auditorium will be from $3.50 to $5 per day on the American plan, or $2 to $4 on the European plan.

Mr. A. Edward Newton, of the Cutter Electrical Company, Philadelphia, spent some days in New York.

Death of Dennis Doren.

News was received in New York city last Friday that Dennis Doren, general superintendent of construction for the Western Union Telegraph Company, had died suddenly at Norwalk, Ohio. Mr. Doren was one of the pioneers of the telegraph, having identified himself with the Western Union Telegraph Company soon after its formation.

Mr. Doren was born in Wooster, Ohio, February 13, 1830. About 1850 he entered the service of J. H. Wade, of Cleveland, Ohio, who was then the principal owner of what were known as the "Wade telegraph lines," most of which were located in Ohio. Mr. Doren, whose practical ability was developed in the construction and maintenance department of telegraph work, received his first experience in building and repairing lines from J. S. Bristol, who was superintendent of construction and repairs during the early life of the Western Union.

In 1861, when Gen. T. T. Eckert, now president of the Western Union Telegraph Company, was placed in charge of the military telegraph in the Department of the Potomac, Mr. Doren was made superintendent of the construction corps in that branch of the army. His record for ability, courage and judgment in this position was of the highest. Mr. Doren had the honor of successfully laying the military telegraph cable from Cape Charles to Fortress Monroe, completing it just in time to report over it the news of the victory of the famous "Monitor" over the Confederate "Merrimac." In 1866, after the consolidation of the United States and the American telegraph companies with the Western Union, Mr. Doren was appointed superintendent of construction and repairs of the eastern division. At this time, one of his most important achievements was the reconstruction of the important lines connecting New York city with the then new Atlantic cable. These were among the first long circuits worked at high speed.

Mr. Doren continued in this position until 1865, when he resigned to accept a similar place with the Atlantic & Pacific Telegraph Company. In 1879 he joined the forces of the American Union Telegraph Company, and in 1881 was elected president of the American Cable Construction Company. Later in the same year, when the consolidation of the American Union, the Atlantic & Pacific, and the Western Union companies was effected, Mr. Doren was made general superintendent of construction and repairs of the Western Union Telegraph Company, and held that responsible position up to the time of his death.

INDUSTRIAL NOTES FROM THE WEST.

K. McLennan & Company, Chicago, are sending out some circular matter containing "instructions to the motor or dynamo tender." As the "instructions" consist merely of a card advising the dynamo man to use the company's commutator compound, many a recipient will probably smile at the simplicity of the advice.

Messrs. W. D. Ball and A. F. Nagle, Chicago, who have heretofore been separately engaged in consulting and engineering work, have joined their interests, and will hereafter carry on a similar business under the firm name of Nagle & Ball. Both gentlemen are electrical and mechanical engineers of the highest ability, and with their united efforts are sure of securing a large share of the business.

Judging from the results so far obtained by Prof. J. K. Pumpelly in his experiments upon a new form of storage battery, it is probable that within the next 30 days an entirely new form of battery will not only be on the market, but in actual service, propelling motocycles on the streets of Chicago. While it is a little too early to give any detailed description, it may be stated that the object sought for—*i. e.*, to produce a cheap, light and yet commercially durable battery—has been obtained. The Crofton Storage Battery Company is getting ready to place the battery on the market.

As the demands made by the user of electric light and power apparatus become more and more exacting as regards quality and durability, quite a number of concerns have gradually entered the manufacturing field with a view of producing some specialty which formerly was considered merely an accessory of some larger machine. Prominent among such firms is the Miller-Knoblock Company, of South Bend, Ind., which some time ago engaged in the manufacture of street railway and other commutators. In the making of these commutators the company uses nothing but pure Lake Superior hard-drawn copper, or the standard bars of the Billings & Spencer Company in some cases, and a high grade of mica. By using the Morrell hydraulic process, in which the commutators are subjected to a pressure of as high as 25 tons, absolutely uniform results are secured. Mr. A. W. Morrell, who is in charge of this department, is an engineer of wide experience, and while in St. Louis, engaged in similar work, probably did more to standardize the methods and raise the quality of street railway repairs than any one else. The Miller-Knoblock Company invite correspondence from all users of commutators.

C. E. K.

Chicago, February 25.

PUBLIC CONTROL, OWNERSHIP OR OPERATION OF MUNICIPAL FRANCHISES.*

WITH SPECIAL REFERENCES TO ELECTRIC LIGHTING.†

BY R. R. BOWKER.

(*Concluded from page 111.*)

THE PREFERABLE SYSTEM.

The modern city, it seems to me, should own and control its streets, including, as far as possible, both sub-soil and surface facilities of distribution; should itself provide sewerage and water supply, but should leave to private companies the operation of industries which involve manufacture or complex administration. The city should receive adequate rent for the use of its street facilities, should obtain for the people the social increment by limitations of profit or price, and should give to the private companies every economic advantage of tenure, centralization, etc., possible to municipalized industry. Charters should be granted for a specific period say of 25 years, with renewals at the option of the municipality upon similar terms, so that satisfactory service would insure a continuing franchise. With the proviso, as in the New York ferry leases, that the new lessee might take over the operating plant at an appraised valuation, this would invite and safeguard the investment of private capital without undue risk. Provision should be made, as in Paris, to secure for the public the most modern improvements and consequent reductions in cost. The city should have its own services, as street lighting, at cost, this including of course, investment as well as operating charges. With such safeguards, one gas company and one electric light company, competing with each other, and one surface railway company affording facilities for transfer and competing with an underground or elevated system, would give the best economic results. Parallel grants should be made only on the certificate of an authority like the Massachusetts Gas Commission or the New York Railway Commission that they would be for the public benefit. If the grant is not exclusive for the whole city, it should be limited to specified sections

The city should provide under its main thoroughfares an accessible subway tunnel, as a modern building has in its cellar space for its working apparatus. This sub-street, such as London now has and Stockholm has planned, should give easy access by manholes to the sewers, and should provide space for water mains, gas pipes, electric conductors and other services, both for trunk lines and for local distribution, with access to buildings by side recesses between each two buildings. In other streets a distributing subway system of ducts, preferably on each side to prevent displacement of paving, should be comprehensively planned for water, gas, electricity, etc., with house access at the curb between each two buildings. Rent for these facilities, covering construction interest, maintenance cost and a license for such use of street facilities, should be charged by the city to its own water department, for instance, as well as to the private companies. Where a special system requires private construction, the street license but not the construction interest should be charged. The city might also own and lease the track for a surface railroad as in Toronto, as well as provide a rapid transit tunnel, as is proposed in New York.

An honest and efficient municipal inspection should protect the interests of the citizens. Actual tests should be made from time to time and the results published. Meters should be tested by municipal inspectors on demand of any consumer, as in London, the company paying the charge if the meter is within and the consumer if it is without the legal requirements. Under these conditions the public should get the surest and best service at the lowest price, the few advantages of a municipalized industry with the many advantages of a privately managed industry.

ECONOMIC OBJECTIONS TO MUNICIPALIZATION.

The first vital economic objection to municipalization is on the score of cost. Economy is closely associated with the progressive management necessitated in private enterprise. A public body does not get its work done as well or as cheaply as a private corporation. The mixture of politics with business is demoralizing to both. Government plants are apt to be "behind the age." The United States Government, I have been told, exhibited at Philadelphia in 1876, and again at Chicago in 1893, a cartridge making machine which private manufacturers had superseded in 1871. The electric lighting plant installed at Manchester in 1893 was three years behind date at that time. The cost of government work is notoriously greater than that of private work. Ships built in the navy-yards are known to take longer to build, to cost more and often to be less satisfactory than those built by private contract. In New York the city charges to private companies $8 for the first square yard and $4 for each additional yard for repaving granite block on concrete foundation, and the charge is defended as practically the cost to the city. The same work was done by a private corporation for the city at $2.50 with some profit, and a recent job of which close and complete record was kept cost exactly $2.02½ per square yard. The Court House in New York and the Capitol at Albany are notorious examples of the waste of public moneys in public work too often invited by our political system.

A municipalized industry is at correspondingly serious disadvantage as to management. A modern city government, however highly organized, attempts too much when it attempts everything. While the whole trend of industrial progress is toward consolidation within the same industry, it is toward a differentiation of different industries. A private corporation usually makes contracts for work outside its immediate field, because a specialized organization can do better in any specific work than a general organization. Asphalt paving, for instance, is done for all our cities at best advantage by the Barber and other asphalt companies, which do only this one thing. Contract work in the best private hands safeguards a public employer as no other method can—which is in itself the strongest argument against the municipalization of specialized industries. The Brooklyn Bridge railway, cited as proof that a municipality can operate a railway, was, as unfortunate Brooklynites know to their cost, disastrously managed, and the crush at its terminals was dangerous to life, until a commission of experts trained in the service of private companies devised remedies. The contrast between American and English railways, private corporations, and German railways, state organized, is in point; the Pennsylvania and the New York Central systems are recognized as foremost in the world. The Italian Government after "nationalizing" its railways organized two private companies to take over and operate them. In England the private telephone company's "centrals" have taken over nine-tenths of the business, and a consolidation of the government and the private system is probable. In fact, the public service fails to assure the adequate salary and permanence of tenure necessary to retain concentrated and continuous directive ability of the highest order, although the public distinction of office holding in part offsets the lower salaries in public employment. Many great corporations in New York pay their executive as high or higher salaries than that of the Mayor of New York, even under the new charter, and this high payment for brains is not at the expense of good payment for wages. Successful direction means an increase of business, which gives wider employment to more men at better pay.

A municipalized industry, further, is under constant political pressure to pay wages higher than the market rate. The trades unions, indeed, favor municipalization largely because they consider that this would involve better wages. On the contrary, nothing could be more demoralizing in the actual labor market, nor more destructive to the legitimate influence of trade organizations. Municipalized industries would not be sufficient, short of entire socialism, to establish the market rate of wages. If municipal industries should pay 25 cents a day more than private industries, there would be a rush toward the municipal industries. Men would be induced to pay that, or a part of it, for a place, and would become the easy prey of designing politicians or corrupt superintendents. Such an increase of wages in a force of 1,000 men would mean $375,000 a year, with enormous possibilities of personal corruption and public demoralization beyond anything at present known. It is said that the postal, police and fire services have been kept "out of politics;" as a matter of fact, these classes, largely through their benefit associations, exert an enormous influence at Washington and at Albany, particularly in pressure to raise wages; and in the recent New York election one political "boss" appealed specifically to the interests of these special classes for support. Even under better municipal conditions, as in England, it has been found most difficult to preserve discipline in a municipalized industry, because of the pressure of politicians to reinstate discharged men, as I was personally told in the municipal electric lighting station of a great English city.

FISCAL RELATIONS OF MUNICIPALIZATION.

It has been urged as an objection that private corporations are too often "extortionate monopolies," robbing the people of their rights to the social increment. This is in part, and in some cases, true, but it is an objection that can be met in a better way than by municipalization. It is evident that the trend in the industries cited is toward consolidation, but it is true also that a consolidated company usually reduces prices by virtue of diminished cost for the business motive of increasing consumption and profit. The true objection to trusts is not economic, but financial and political. The enormous advances in water and gas stocks show that in these cases the social increment value has in fact gone, not to the public, but into private pockets. It is not always the original investor nor indeed the present investor who profits by such advance, for with increasing profits and a diminishing rate of interest the price of the stock goes up until it pays only a normal return, but more probably the speculative "operator." But this objection can be fairly met by the limitation of franchises and the fair regulation of prices, limiting the return say to 10 per cent on actual investment, with proper depreciation and amortization allowances, or providing that profits above a normal return shall be shared with the municipality. The latter is the better way, because it leaves to private management an incentive to efficiency and economy, and like economic rent it does not tend to increase price. Such regulation should be not by legislative interference, but by provision in the grant or

*From *Municipal Affairs*.

†This paper is written from the point of view of the economist and citizen, but with the data and experience gained as the executive of the New York Edison Company. To my mind, this should not involve opposition of interests; as he most serves his party who best serves his country, so he most serves the interest of a public service company who best serves the public. I mention the relationship, however, to forewarn readers of any unintentional bias. It is difficult for any, outside the business cited, in an academic discussion, to obtain real bases of comparison.

charter. Private corporations doing public service should also be required to print full reports. These provisions would tend to assure fair prices, prevent over-capitalization, and leave little margin for corruption.

It is rightly urged in favor of municipalization that a city can borrow for investment purposes on its bonds at a very low rate of interest. But it is evident that a private company, safeguarded by reasonable conditions, can borrow on its bonds on almost as close rates, certainly within one per cent. and the higher rates have been chiefly because of the uncertainties incident to our American methods. The increase in market value of stocks as dividends have increased, show that in a well settled business, as that of the London water companies and the New York gas companies, the shareholders in a private company no longer obtain much above the normal rate of interest, which is steadily decreasing.

POLITICAL OBJECTIONS TO MUNICIPALIZATION.

The final and strongest argument against municipalization is, even more than against trusts, political rather than economical. The charge against private corporations that many of them have been among the worst breeders of political corruption is, in some but not in all cases, probably true. This is in great part the fault of public opinion. The public does not pay adequate salaries to its legislators. Men taken from their personal business during the earning months of the year do not receive enough for their living and their campaign expenses. Those of honest purpose find it not easy to resist the "opportunities" offered them by clever lobbyists, while the less scrupulous, sent both from city and country districts, almost openly take or ask money bribes. Public opinion lends an easy sanction to the fallacious argument, that it is better to surrender to highwaymen a part of the property in one's charge than to lose it all, which permits men of the highest personal integrity and honesty to condone or overlook, through an indirect chain of agents and lobbyists which evades responsibility, what they would not personally or in their own private interests permit. It is indeed highly to the credit of our legislators that so many, under such temptation, are ready, as I have found, to protect a corporation against "strikes" when it is honestly trying to serve the public and is prepared to make its facts and figures fully known. But to take passage on a pirate ship so as to avoid danger from pirates, is not altogether wise, and to give over an industry to the spoilsmen by municipalization so as to prevent corruption, is scarcely the common sense or commendable course.

The opportunities for and invitations to political corruption in our great cities and in our state legislatures, if great industries now in private hands are taken over by the city or the state, would be the most serious menace possible to really democratic and American institutions. In the past few years the growth of paternalism in our government, and of the restrictive policy in our trade relations, foreign and domestic, has turned American thought unconsciously toward what is practically state socialism, the direction or misdirection of the affairs of an individual or an individual enterprise by governmental machinery. The American theory of government is based on individual freedom, the right of an individual to manage his own affairs without interference, unless he interferes with his neighbor. Democracy and socialism are in this sense absolute contraries. Only a generation ago this country freed itself from one form of industrial slavery; it is the great argument against the municipalization of industries that it would be not only a step, but a long stride, toward the new industrial slavery of state socialism.

THE DIESEL HEAT MOTOR.

AN INTERESTING DEVELOPMENT IN POWER ENGINES.

A recent invention by R. Diesel, Munich, who has been working on the problem for the last 15 years, claims to create a complete revolution in the production of power, a revolution such as has probably not been experienced before in human history. Diesel's caloric motor, which is stated to be no longer an experiment, but an established commercial factor, pretends to nothing less than to finally supersede the steam engine.

It is stated that one of the ordinary high-pressure steam engines utilizes only four per cent of the energy stored in the coal consumed. A Corliss engine of the best modern type may reach eight per cent, while a triple expansion engine of 1,000 horsepower or more, with conductor and perfected cut-off, does not surpass 12 to 13 per cent as the maximum achievement of the best steam engine at its present state of development. The question naturally arises, what becomes of the remaining 87 per cent to 96 per cent of the coal consumed? In the first instance 20 per cent to 25 per cent are partly lost in the furnace and partly in creating draft in the smoke-stack, incidentally also causing the smoke nuisance, which is becoming more annoying from day to day, especially in large cities. The remaining 70 per cent are lost through radiation at every point and by the costly evaporation of water, for, while the heat created under the boiler may reach 2,500 to 3,000 degrees Fahrenheit, the steam created will, at the very highest pressure used, have a temperature of only 390 degrees Fahrenheit, which means a dead loss by conversion and recondensation of two-thirds of the heat, leaving available for work only 24 to 26 per cent.

To improve upon this, the inventor of the Diesel motor conceived and announces the following plan:

Pure air is compressed in the cylinder of this motor, thus generating a temperature of about 600 degrees Centigrade. The fuel to be used, such as gas, petroleum or powdered coal, is thereafter injected into the compressed air, where it is gradually and completely burned up at a much lower temperature than ever before accomplished. During combustion and during the succeeding expansion it is entirely turned into work. The injection and combustion of the fuel takes place as the piston in the cylinder begins its return stroke. It ceases when it has reached about one-eighth or one-sixth of its way back, and it is so regulated that the increase in the temperature created by the compression of the air and subsequent combustion of the fuel is reduced by cooling off, due to work done during the succeeding expansion. Thus, practically, there is no increase in sensible heat, since the heat caused by the combustion of the fuel is immediately turned into power, and the motive power thus gained is only reduced by the small amount required for the compression of the air.

The practical operation of the Diesel motor during nine months shows that it can turn 26 per cent of the heat units of the fuel consumed into mechanical power, which means an effect of 200 per cent compared with the best steam engine and 150 per cent compared with the best gas and oil engines. But other features of this remarkable motor, which has met the fundamental requirements of a perfect heat motor to a degree not hitherto attained by any other device, are not less important.

The Diesel motor will work with nearly equal economy at half as at full load, and in this it therefore excels even the best steam engines.

The construction of the Diesel motor is much simpler, and therefore subject to less repairs, as in comparison with the ordinary gas or oil engines no igniter, gas atomizer or mixer is necessary, while compared with steam engines no boiler, condenser or coal bunkers are required, an advantage which can hardly be overestimated in steamship building.

The injection and combustion of the fuel can be regulated automatically, according to the power required, and changes in the load of the motor are governed to a nicety.

The motor can be set to work without loss of time, since once operated it is again started by simply opening a valve admitting the stored compressed air into the cylinder. It runs almost noiselessly and without shock or jar, and in this differs materially from the best existing gas or oil engines.

The interior parts will not soil, as the fuel used is completely consumed, which is shown not only by a chemical analysis of the waste gases, but also by their absolutely odorless escape into the air.

Thus far the fuel used has been mainly petroleum, but it has been demonstrated that common illuminating gas is a perfect material for this purpose, and the use of producer gas at American prices would, it is estimated, furnish power at one-half the cost of the steam generated with coal.

Expert commissions from all civilized countries, including Japan and Australia, have been sent to Augsburg, where the motor has been in actual operation for fully a year, and their unanimous testimony gives the general verdict that its advent must be hailed as the beginning of a new chapter in the application of heat as motive power. The motor has been examined and warmly approved by the great scientists, among them by Lord Kelvin, of Great Britain. It is expected that the suppression of boilers, coal bunkers and condensers will revolutionize the machinery of torpedo boats and sea-going vessels.

At Nuernberg, Diesel's motors are being built at present for street cars and general railroad work.

Mirrlees, Watson & Yaryan, the world-renowned marine-engine builders, of Glasgow, are building reversible engines on the Diesel system, while European locomotive works are adapting the system for locomotives.

The Diesel motor has been patented in all countries where patents are granted for inventions, and the rights for the United States and Canada have been acquired by a company since incorporated under the laws of New York State as the Diesel Motor Company of America, with offices at 11 Broadway, New York.

A breakdown in the big power-house during the small blizzard at Cleveland, Ohio, on the night of February 15, caused a blockade on all the electric lines in the city. The breakdown occurred at 5 o'clock in the afternoon, at the time when the traffic is the heaviest, and the cars were stalled for over two hours. Though many of the lines are controlled by separate circuits, yet the big power-house furnishes the current for all the lines around the square through which most of the cars pass, thereby causing a big jam at that place. It was late in the evening before any of the lines were running on schedule time.

STANDARD DIAGRAMS FOR UNIFORMITY IN ELECTRICAL ENGINEERING AND PATENT OFFICE DRAWINGS.

APPROVED AND ADOPTED BY THE CHICAGO ELECTRICAL ASSOCIATION, FEBRUARY 4, 1898.

PRESIDENT'S ANNOUNCEMENT.

TO THE ELECTRICAL PUBLIC:

The necessity for a standard system of electrical diagrams was first brought to the notice of the Chicago Electrical Association through the reading before that society, on the evening of January 15, 1897, of a paper on "Conventional Diagrams of Electrical Apparatus," written and delivered by Mr. D. W. C. Tanner. His active experience in matters pertaining to electrical patents especially fitted him for presenting such a subject. The discussion by the society at the time and the subsequent favorable criticism in the electrical papers, led the society to take steps toward publishing a series of selected diagrams more complete and comprehensive than any heretofore presented. Accordingly, a committee was appointed, with Mr. Tanner as chairman, and Thos. G. Grier, Kempster B. Miller, and S. G. McMeen (ex-officio) as fellow members. Mr. C. Wiler was subsequently chosen an additional member of that committee to take the place of Mr. Tanner, who, unfortunately, was obliged to resign. Mr. Grier was then appointed chairman, and the work has been pushed to completion. We anticipate that this volume will furnish the possessor with a convenient, concise form of expressing his ideas in such a manner that they can hardly fail to be understood by any man having a fair knowledge of electrical principles. The ultimate result will be to make all electrical diagrams clear and uniform in their representation of circuits and apparatus, and save much time and patience, now lost in seeking in printed specifications for explanations of the various instruments shown.

F. S. HICKOK, President.

Chicago, Ill., February 11.

REPORT OF COMMITTEE ON STANDARD DIAGRAMS.

TO THE PRESIDENT AND MEMBERS OF THE CHICAGO ELECTRICAL ASSOCIATION.

GENTLEMEN: The undersigned, your committee, appointed for the selection and preparation of conventional diagrams or symbols representing the various pieces of electrical apparatus in common use, respectfully submit the following report, together with the sheets of drawings annexed.

The time has arrived when the diagrammatic illustration of electrical apparatus should be reduced to an art. A uniform code should be established containing a diagram for each piece of apparatus, each diagram being at once simple and, so far as possible, suggestive of the particular piece of apparatus which it is designed to represent.

A decided improvement has been made in this direction during the last few years, yet at the present time the system is far from perfect. Its development has suffered through a lack of unity among the various makers of these diagrams.

The electrical divisions in the Patent Office have done more toward the development of this art than any other one agency. Often in a drawing accompanying an application for a patent, when a circle was used to represent a battery, and another circle exactly like it to represent a dynamo, and still another, differing in no respect, representing the ground, the drawing was necessarily confusing, and was followed with difficulty, if at all. In such cases it has not been infrequent for the Patent Office to suggest to the inventor or his attorney that he submit a new drawing, using a certain adopted form or diagram to represent his battery and another to represent his dynamo, and so on. In this way, and with the well directed efforts of a number of patent attorneys, a great improvement has been made. These diagrams are to further assist in this direction.

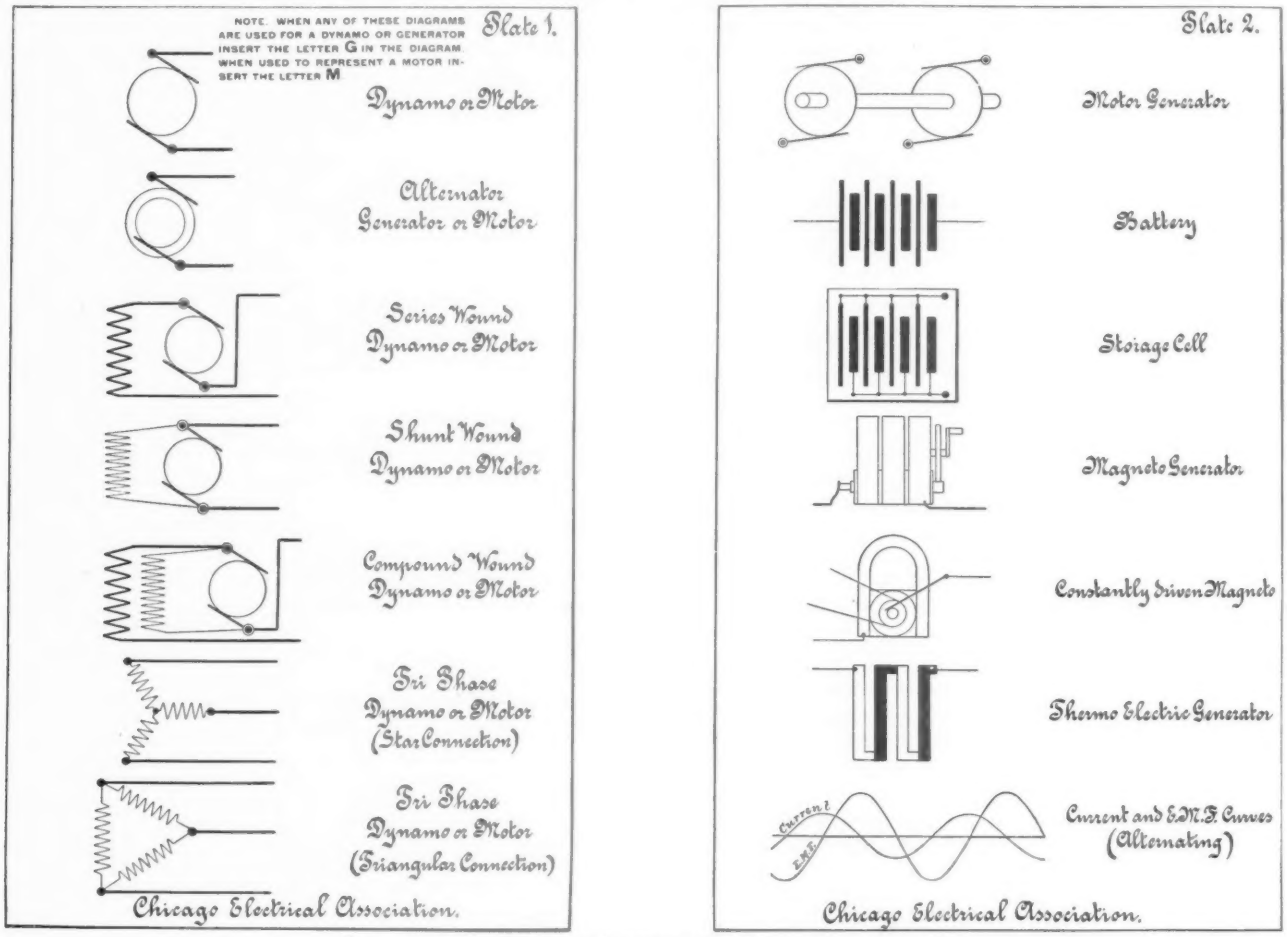
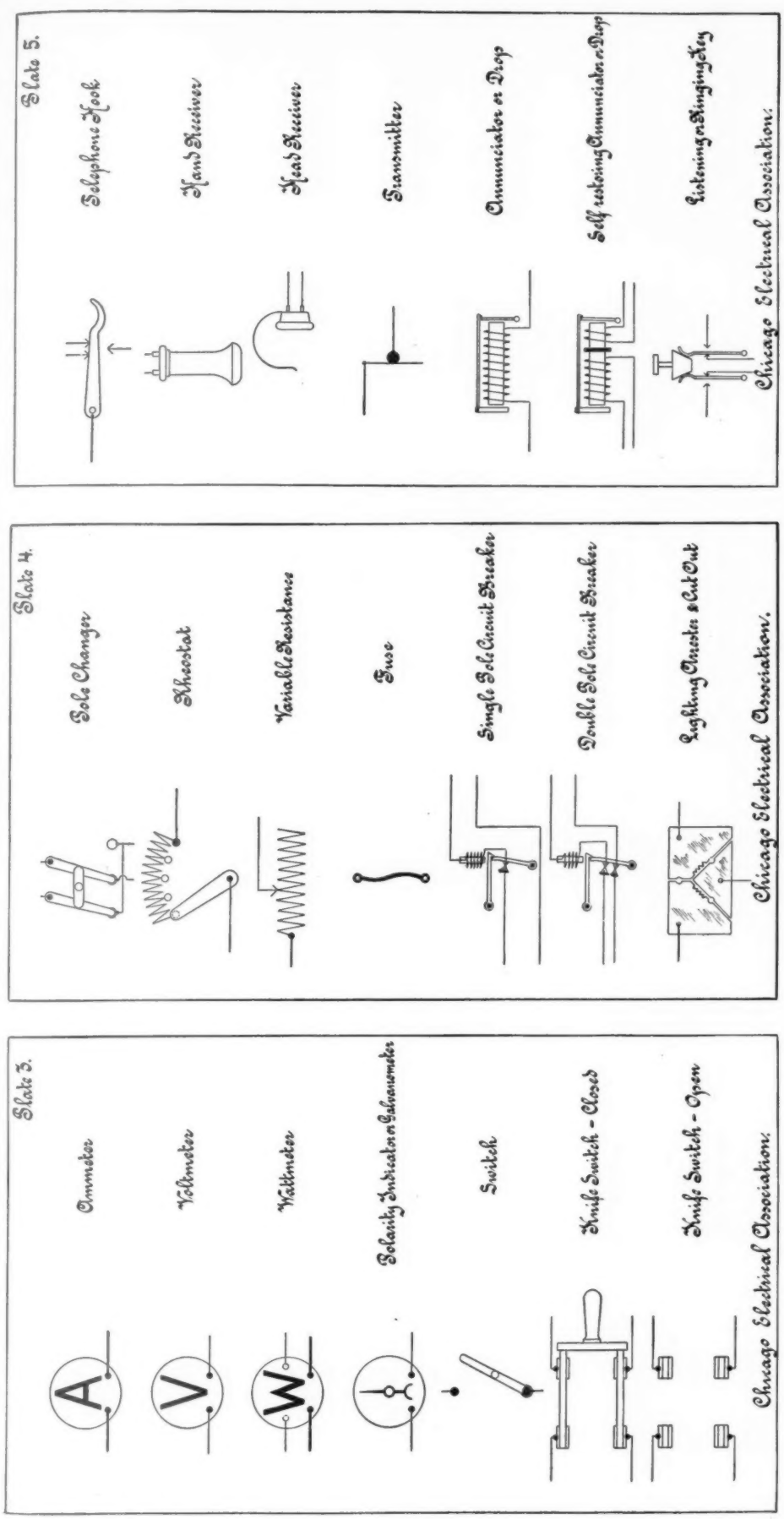


Plate 1.
NOTE. WHEN ANY OF THESE DIAGRAMS ARE USED FOR A DYNAMO OR GENERATOR INSERT THE LETTER G IN THE DIAGRAM. WHEN USED TO REPRESENT A MOTOR INSERT THE LETTER M.
Dynamo or Motor
Alternator Generator or Motor
Series Wound Dynamo or Motor
Shunt Wound Dynamo or Motor
Compound Wound Dynamo or Motor
Tri Phase Dynamo or Motor (Star Connection)
Tri Phase Dynamo or Motor (Triangular Connection)
Chicago Electrical Association.
Plate 2.
Motor Generator
Battery
Storage Cell
Magneto Generator
Constantly Driven Magneto
Thermo Electric Generator
Current
E.M.F.
Current and E.M.F. Curves (Alternating)
Chicago Electrical Association.

PLATES 1 AND 2.—STANDARD DIAGRAMS FOR ELECTRICAL DRAWINGS.

It is well to state that no attempt at originality has been made in their selection. All available sources of information have been drawn from, and it has been the aim of this committee to adopt the best, regardless of whether they had been in common use or not. In deciding upon the diagram for any particular piece of apparatus, the question was considered from several standpoints. Simplicity always carried the greatest weight, and when several diagrams of apparently equal simplicity were to be chosen from, that one was taken which seemed most suggestive of the actual piece of apparatus represented.

The sheets of drawings attached to this report are, for the most part, self-explanatory and, we think, need no comment. The representation of



PLATES 3, 4 AND 5.—STANDARD DIAGRAMS FOR ELECTRICAL DRAWINGS.

a dynamo or motor by a circle with two tangent lines showing the commutator and two brushes has long been in common use. This form of diagram may be used for any direct-current machine in drawings where the form of winding of the machine is either well understood or is not essential in the system to be represented. Similarly, the figure below it may be considered the generic alternator. Where it is necessary to show particularly the kind of a machine, the field coils may be added, as shown in the next three figures, which are so simple that they can not be misunderstood by one accustomed to read electrical diagrams. The diagram of the triphase dynamos or motors are shown by the characteristic windings of their armatures only. Where there is room for doubt as to whether one of these diagrams represents a motor or a dynamo a letter M or G, as the case may be, will clearly distinguish them.

The diagram representing the motor generator will, perhaps, be subject to adverse criticism. In its adoption, good perspective is undoubtedly sacrificed for ease in drawing, but who can say that the diagram is not suggestive of what it is intended to represent?

The differentiation of the diagrams for the primary battery and for the storage battery from each other and from the ordinary diagram for a condenser, has been the subject of a good deal of thought. The primary battery diagram is the one in ordinary use. The storage battery diagram differs from it by having the plates connected in multiple, as in practice, and by the drawing of a square around it. This diagram will hardly be taken as representing a condenser, for the reason that the lines representing the plates of the battery are made thicker than those connecting the plates to the battery terminals.

The reason for not representing the ordinary hand magneto-generator and the constantly driven generator by the same diagram, is that a need actually exists for a distinction between them. This is especially so in diagrams of telephone exchange systems where it is often difficult to distinguish between the hand generators at the subscribers' stations and the power generators at the central office.

The electrical measuring instruments need no comment, we think, owing to their extreme simplicity and the unmistakable evidence which they bear to their identity.

In the matter of single and double circuit-breakers, many forms of diagrams were considered, each of which would probably have their advantages in certain places. This brings out well the fact that these diagrams must be taken merely as a guide, and not as a rigid code which must be absolutely followed. For instance, if it were essential that the circuit-breaker should have an operating coil in each of the line wires, then it must be left to the designer or illustrator to make his own diagram for illustrating the particular case in hand.

On the simple telephone diagrams, but little comment is needed. It would be well if all would adopt the form of transmitter shown, from the fact that its construction is so extremely simple.

The listening and ringing key for telephone switchboards is a simple representation of one of these pieces of apparatus in common use. The remarks made concerning the cut-outs will apply with equal force to these.

Two diagrams for polarized bells have been shown. The one on the right-hand side is preferable, where its meaning can not be mistaken. The almost universal adoption of this form of diagram has led this committee to show it here, although, unless one is familiar with polarized bells in telephone work, it must be said that it is not at all suggestive. In cases where it is thought best to be extremely explicit, or where the immediate context of the diagram does not suggest the use of a polarized bell, the diagram on the left is to be preferred.

The diagram for a polarized relay is, we believe, given here for the first time. By changing the plus and minus signs from one side of the armature to the other, it may be indicated that the relay will close on a minus current and open on a plus current, or vice versa. This is a feature which will be found at times very convenient.

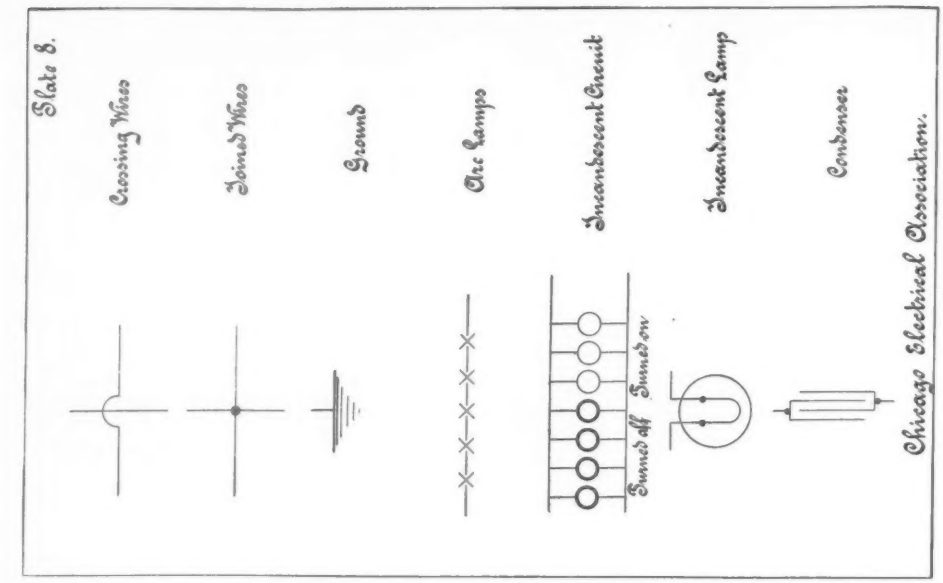
The distinction between the ordinary resistance and inductive resistance is both simple and suggestive, the presence of the core inside of the coil conveying to the mind the presence of a certain amount of self-induction.

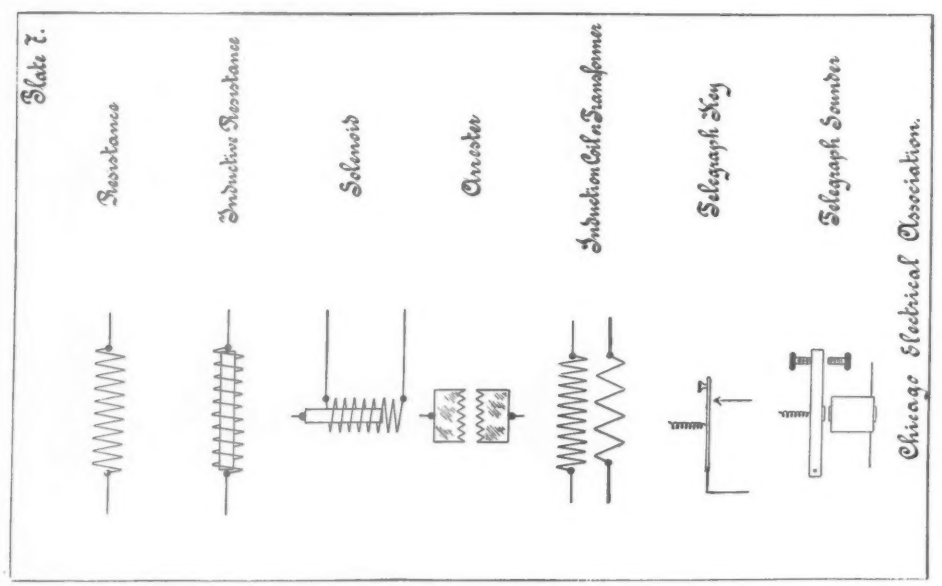
The use of two parallel zigzag lines for induction coils or transformers, lends itself readily to the distinction between the primary and secondary, between the step-up and step-down transformers, and, moreover, its construction is of such a simple nature, that it was chosen without hesitation by this committee from among dozens of other good diagrams for representing the same apparatus.

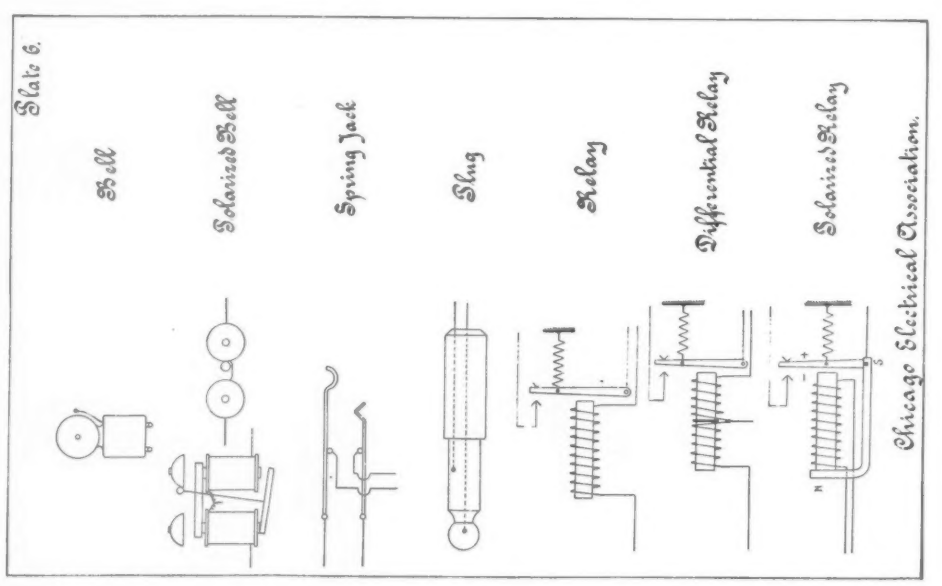
In the telegraph sounder the magnet coil has been represented in outline. In this connection it may be said that where it is not essential to know the nature of the winding or the direction of the convolutions, this same form of magnet might be adopted in any of the relays or annunciators used elsewhere in these diagrams.

The selection of a symbol for "a ground" which might be universally accepted is apparent. This custom of some artists of placing palm trees and grass, or the drawing of miniature landscapes surrounding their ground wire may add somewhat to the artistic effect, but certainly nothing to the clearness or merit of their work.

In conclusion it may be said that it is believed that where any particular piece of apparatus is to be presented for which no specific diagram is here found, it will be an easy matter for the person desiring such diagram to make it from the elements here shown.







PLATES 6, 7 AND 8.—STANDARD DIAGRAMS FOR ELECTRICAL DRAWINGS.

The effort of your committee has been to group acceptable conventional diagrams in a convenient form, and in carrying out the instructions of the Chicago Electrical Association we bring to a focus a matter which has been under discussion for several years.

By the official adoption of these diagrams by a recognized body of electrical men, a standard of uniformity is presented to the public. The committee realizes that this list is not complete, but hopes that it will be a nucleus of a uniform symbolic language among electricians.

From time to time, as suggestions may be offered, suitable additions can easily be made to our present selections. Respectfully submitted,

THOMAS G. GRIER,
KEMPSTER B. MILLER,
C. WILER,
Committee.

Chicago, Ill., February 4.

In Favor of the National Conduit and Cable Company.

After nearly five years of litigation a decree in favor of the National Conduit Manufacturing Company (now the National Conduit and Cable Company) has been entered against the Connecticut Pipe Manufacturing Company, of New Haven. The decision was handed down at Hartford, Ct., and is as follows:

This cause having been heard at this term of this court, upon the pleadings and proofs, and having been argued by counsel for both parties, and the court having held the same under advisement,

Now, upon due consideration, and being of the opinion that the defendant, the Connecticut Pipe Manufacturing Company, is not in a position to attack or question the validity of the said letters patent No. 395,584, and to deny that Edward H. Phipps was and is the first, true and original inventor of what is described and claimed in letters patent of the United States No. 395,584 in the bill of complaint mentioned, granted to Edward H. Phipps, assignor to Edward S. Perot and James P. McQuaide, assignors of the National Conduit Manufacturing Company, the complainant herein, bearing date January 1, 1889, for improvements in conduits for electric wires or cables, and the court being of the opinion that the defendant has infringed the aforesaid letters patent, it is therefore

Ordered, adjudged and decreed, that the defendant, the Connecticut Pipe Manufacturing Company, is not in a position to, can not, shall not and must not question the validity of the aforesaid patents, either in law or in equity, and that the complainant is the owner as assignee thereof, and that the defendant, the Connecticut Pipe Manufacturing Company, having infringed said letters patent, and upon the exclusive rights of the complainant under the same by manufacturing, vending, selling and using, or causing to be manufactured, vended, sold or used, a manufacture containing the improvements described in said letters patent and specifically set forth in said letters patent; and it is

Further ordered, adjudged and decreed, that a perpetual injunction be issued in this cause against the said Connecticut Pipe Manufacturing Company and its officers, agents, clerks and servants from making, using or selling any of the inventions described in said letters patent No. 395,584, except so far as the same shall relate to water pipes, pursuant to the prayer in said bill of complaint in that behalf; and it is

Further ordered, adjudged and decreed, that the complainant do have and recover of the defendant the profits, gains and advantages which the said defendant has derived or received, or to which it may be entitled by reason of the aforesaid infringement of said letter patent, and that the complainant do recover of the defendant all damages which it the said complainant, has sustained by reason of the said infringement of the said letters patent by the said defendant, and that this cause is hereby referred to —— ——, to take and state an account of said profits, gains and advantages, and to ascertain and assess all damages as aforesaid, and to report thereon with all convenient speed; and it is

Further ordered, adjudged and decreed, that the complainant on said accounting have the right to cause an examination of said defendant and each or any of its officers or agents, *ore tenus* or otherwise, and also the production of the books, vouchers or documents of each and all of said defendants, and that each and all of said defendants attend for such purpose before said master from time to time as said master shall direct; and

It is further ordered, adjudged and decreed, that the costs shall be taxed for the complainant, and that judgment shall be entered accordingly.

WM. K. TOWNSEND, Judge.

ALUMINUM AS A RIVAL OF COPPER AND BRASS FOR ELECTRICAL CONDUCTORS.

BY ALFRED E. HUNT, S. B.*

(*Concluded from page 118.*)

If kept free from galvanic action with any other metals electro-negative to itself, aluminum is far less easily corroded than copper.

The difficulty of soldering or brazing aluminum is the chief drawback to its use as an electrical conductor. Aluminum can be soldered strongly, but it is a more difficult and slow operation at best as compared with copper, and there is much more rapid weakening of the soldered joint due to galvanic action between aluminum and the metals of the solder than with the less electro-positive metal—copper.

In many places the aluminum can be first coated with copper and the soldering or brazing operation made on the copper surfaces thus formed.

Several forms of joints have been successfully used to avoid the necessity of soldering, the best forms being to use thin aluminum sheets to wrap the joints and to twist or otherwise bind with the aluminum bars or wires to be joined. These wrapped and twisted joints with aluminum sheets can be left smooth on the outside when desired, can be made much stronger than the body of the conductors, and are really a more serviceable job than soldered or brazed work in many cases with copper. One very practical way of making joints of aluminum wire is to roll the thin aluminum sheet of about six inches width into two cylinders from opposite edges of the sheet. These double cylinders are very cheaply made on mandrels in a lathe. The ends of the wires to be joined are inserted in these cylinders from opposite ends, and both the wire and sheet twisted with pliers until a firm joint is secured, much stronger than the body of the wire. The joint can readily be made impervious to the air and moisture.

The C. McIntire Company, of Newark, N. J., have a patented joint which is made very much along the lines of this joint. Information regarding their patented form of joint can be obtained by correspondence with them as above; also the American Electric Fuse Company, Chicago, Ill., make a very satisfactory point.

Another disadvantage which handicaps aluminum in special uses for electrical conductors will be, where the material has to be insulated, that the cost of insulation will be approximately one-third greater for the larger section required in aluminum over the cost for the smaller section of copper required for the given conductors; and where aluminum is to economically compete for insulated conductors, the price of the aluminum will have to be further reduced to meet this contingency.

Aluminum is soon to be placed in an extensive line of conductors, where this added extra cost of insulation will be determined by actual fabrication, the Pittsburgh Reduction Company in this particular case agreeing to pay the added costs, in order that actual experience may be gained as to their relative amounts.

There are certain places where aluminum will be at a disadvantage over the smaller section of equal conductivity of copper, in ducts or conduits where space is a considerable item. In such cases the use of aluminum would necessarily be prevented.

An ample field for the employment of aluminum for some time to come, however, seems open at the present time for bare transmission lines, especially for high potential long-distance work and for long-distance telephone lines and for rapid transmission telegraph lines.

Aluminum next to gold is the most malleable of all the metals and is much more malleable than copper.

Aluminum in ductility stands next to copper, and is easily drawn into all sections that are furnished in copper for electrical conductors.

Aluminum can be furnished fully as uniform in its composition as copper.

The metallurgy of copper is comparatively complicated, owing to the difficulty of converting its ores into the oxide free from impurities. In most of the copper ores used, sulphur, lead and iron are contained, as well as small quantities of other elements, as arsenic and antimony. All of these elements in metallic copper very materially lower its electrical conductivity. The native pure copper of the Lake Superior region enjoys the preference, due to its uniformity and freedom from impurities, for many purposes, but for electrical conductors the electrolytic copper is most used.

Aluminum can now be furnished for electrical conductors at least 99.50 per cent pure—it is granted not as yet rivaling in purity of composition the best electrolytic copper used for the purpose of electrical conductors. When as pure a metal is obtainable, undoubtedly it will much more nearly rival copper in conductivity section for section.

Aluminum has been already in successful operation as an electrical conductor for some time. The first use in a large way was with the conductors for the electric current at the Niagara Falls Works of the Pittsburgh Reduction Company, where it has been used since the year 1895; the currents were of several thousand horse-power each, and of very large volume and comparatively low voltage. Both in conducting power, freedom from heating effects, power of withstanding corrosion, ease of making, wear and efficiency of joints, the aluminum conductors have given better results than copper used for the same purpose.

In the Chicago stock yards a mile of aluminum wire of No 11 gauge has now been in use for some time, upon a telephone line that has been badly corroded out in copper wire, due to its being frequently subjected to sulphur gases from passing locomotives. The aluminum line is giving good satisfaction, and is withstanding corrosion much better than did the original copper wire subjected to the same influence.

If the theory be true that the passage of high voltage alternating currents of great frequency is largely upon or near the surface of the conductors only or mainly, then the larger section of the proposed aluminum conductors will make them especially adaptable for such currents.

On telephone lines it has already been determined that as good sound transmission is obtained with aluminum of equal section as with copper in ordinary lengths of less than 10 miles of wire. No comparative results, however, have as yet been determined on long-distance telephone transmission; but the evidence would seem to point that a much less section than 160 of aluminum to 100 of copper will give equally good results.

Aluminum is now being used to replace brass very considerably in the arts, as it is sold in the open market at rates which make it 10 per cent cheaper, section for section, than brass.

For electrical purposes, the metal can be advantageously used to replace brass in a good many ways. Commercially pure aluminum, as furnished to-day, contains less iron than does commercial brass, and is therefore more non-magnetic than brass.

The electrical conductivity of aluminum is far superior, section for section, to brass. Almost every electrical apparatus of present construction in which an iron core—usually a laminated iron core—is used, in motors, generators or transforming machinery, has spaces for ventilation, and the spacing is made by the means of drawn bars, flat rods or angles or tee shape pieces. Brass has been almost invariably used for this purpose in the past—probably on account of its non-magnetic properties as compared with iron or steel. Drawn aluminum sections can be furnished at a price which is 10 per cent cheaper than brass, section for section, and on account of the lightness of aluminum, it can be advantageously used.

Where a low electrical conductivity is desirable, as in parts that are moved in a magnetic field, to prevent the occurrence of eddy currents, aluminum can be alloyed with zinc and other metals that will lower its electrical conductivity to the desired point.

*President of the Pittsburgh Reduction Company.

The annual report of the Sing Sing, N. Y., Electric Lighting Company reports its capital stock paid in as $37,000; debts, $39,000; assets, $9,000.

ADVANCE INFORMATION

New Electric Railways.

ST. CLAIR, MICH.—The French Shore Line Electrical Railway has been granted right of way through East China and China townships.

BALTIMORE, MD.—The sale of the Central Railway to the Baltimore City Passenger Railway Company will lead to extensive improvements to both roads.

EASTON, PA.—The Northampton Electric Railway Company has been chartered to build an electric road between this place and Bethlehem. Hon. James Kerr, of Clearfield, former clerk of the House of Representatives at Washington, and a member of the firm of G. S. Good & Company, of Lock Haven, railroad contractors, is the president of the company.

SPRINGFIELD, OHIO—The Ripley-Dover Bridge and Cincinnati Terminal Railway Company, with a capital stock of $1,000, has been incorporated. The line of the proposed road is from Ripley, Brown County, to the Grand Central depot, Cincinnati. The incorporators are Albert E. Boone, William M. Crawford, William Kirby, Jacob A. Stout and Jesse H. Weirick.

DALLAS, TEX. — Messrs. C. H. Alexander and E. A. Ellis have organized and obtained a charter for a company to be known as the Dallas Consolidated and Electric Street Railway Company. Its capital stock is $1,000,000. The officers of the company are: President and general manager, C. H. Alexander; treasurer, Emmett A. Ellis.

WILMINGTON, DEL. — The Lobdell Car Wheel Company will build an electric railway a mile long to connect their works with the Wilmington City Line in South Wilmington.

SANDUSKY, OHIO—The Sandusky, Castalia & Crystal Springs Railway Company has been incorporated with capital stock of $25,000, for the construction and operation of a railroad from the city of Sandusky to Port Clinton. The incorporators are C. O. French, F. P. Zollinger, A. J. Peters, W. E. Guerin, Jr., and Clark Rude.

STREATOR, ILL.—La Salle County Railway Company has been incorporated; capital, $500,000; to build and operate a street railway in the Counties of Cook, La Salle, Grundy, Will, Kendall, Kane, and Dupage; incorporators, C. H. Rathbunn, W. H. Boys, W. H. Holcomb.

New Incorporations.

NEW YORK, N. Y.—The Symonds & Poor Carbonator Company has been incorporated, to manufacture carbonators, with a capital of $5,000; directors, Nathan Meyer, F. B. McDonald and Frederick Eder, of New York city, and S. L. Symonds, of Boston.

NEW YORK, N. Y.—Insulated Clay Conduit Company, with a capital stock of $10,000, has been incorporated; directors, E. R. Meeker, of Elizabeth, N. J.; J. C. Gilbert and T. R. Thomas, of New York.

COLUMBUS, OHIO—The Columbus Electric Company, with a capital of $750,000, has been incorporated.

NEW YORK, N. Y.—The Hudson Subway Company has been incorporated, to construct and maintain subways or tunnels to hold pneumatic tubes, gas and water pipes and telephone and telegraph wires and cables; capital $5,000; directors are Thomas F. Lennon, of the Borough of Richmond, and Thomas F. Farrell and Walton I. Oims, of New York city.

ALBANY, N. Y.—The Automatic Carbonator Company has been incorporated; capital, $10,000.

BRONXVILLE, N. Y.—Ward Leonard Electric Company, Westchester County, has been incorporated, to manufacture electrical appliances; capital, $100,000; directors, H. Ward Leonard, Charles E. Carpenter, Richard H. Mansfield, Jr., Henry P. Bull.

BELMONT, ILL.—Belmont Gas and Electric Fixture Manufacturing Company has been incorporated by S. H. Ales, Richard E. Burke, for manufacturing purposes; capital stock, $2,500.

OWOSSO, MICH. — Owosso & Corunna Electric Company has been incorporated, with a capital stock of $150,000.

SAN ANGELO, TEX.—The San Angelo Ice and Power Company has been incorporated by George Bond, George E. Webb, C. H. Powell and others, to manufacture and supply electric light, heat and motor power, etc.; capital stock, $30,000.

NEW YORK, N. Y. — The Robb Conduit and Underground Electric Systems Company has been incorporated to acquire patent-rights pertaining to transportation and the working of the same; capital, $25,000, and directors, Fred D. Robb, of 207 Gulpha street, and Dr. George E. Crittenden, of Hot Springs, Ark.; Fritz Andreae, Gertrude Hanbury, of New York, and A. L. Weir, of Cornwall.

New Telephone and Telegraph Companies.

OAKES, PA.—The Chester County Telephone and Telegraph Company has been incorporated with a capital stock of $30,000, to run its lines in Chester, Montgomery, Bucks, Lancaster and Delaware Counties.

NORMAL, ALA.—The Bell telephone is to be extended from this place to Meridianville.

NEWPORT NEWS, VA.—The Newport News Mutual Telephone Company has been incorporated, with M. B. Crowell, president; N. C. Watts, secretary, and Isaac Witts, treasurer; capital stock, $10,000. The company will establish a telephone system immediately.

RICHMOND, VA.—Mr. McIlwaine has introduced a bill to incorporate the Richmond, Petersburg & Southside Telephone and Telegraph Company, with W. B. McIlwaine, A. Rosenstock, T. F. Heath and others; to construct and operate a telephone line between Richmond and Petersburg.

LEWES, DEL.—The Diamond State Telephone Company will extend its line to Lewes.

FAITH, N. C.—J. T. Wyatt can give information concerning company which has been organized to extend telephone system to Salisbury.

MARION, S. C.—The Pee Dee Telephone Company is putting in a telephone exchange.

AUSTIN, MINN.—The Austin Telephone Exchange, with all its connections, has been sold to the Northwestern Telephone Exchange Company, who already control the other connections here.

ROCHELLE, ILL. — Ogle County Telephone Company has been incorporated; capital stock, $5,000; incorporators, F. W. Hamlin, John Delancy and A. W. Guest.

BUFFALO, N. Y.—The Western New York Telephone Company has been incorporated, with a capital of $500,000, to operate a telephone line in Buffalo and in the cities and villages of the counties of Erie, Niagara, Orleans, Genesee, Cattaraugus and Chautauqua. The directors and stockholders are Edward Michael, Henry Koons, Alonzo R. James, Tracey C. Becker, L. F. Messer, Isadore Michael and W. S. Grattan, all of Buffalo, and R. F. Rankine and S. J. Lawrence, of Niagara Falls.

Electric Light and Power.

TERRELL, TEX.—The Terrell electric light plant has just been completed. It was built at a cost of $40,000 by M. A. Joy.

DUBOIS, PA.—The electric light company at this place has purchased the right of way and made arrangements for the extension of their service to Falls Creek, two miles below here.

MT. PLEASANT, TENN.—A movement is being put on foot by a number of prominent business men to organize a company and put in an electric light plant here. Ambrose Lanier is interested.

HUNTSVILLE, ALA.—The Huntsville Electric Company will enlarge its plant, erecting new buildings, putting in new machinery, etc.

ORLANDO, FLA.—The Peninsular Electric Light and Power Company, composed of B. C. Abernathy and others, have been granted a franchise for an electric light plant. They will build plant immediately.

THOMASTON, GA.—J. R. Tarwater, Mayor, may give information concerning the establishment of an electric light plant.

OREGON, MO.—City Clerk may be addressed concerning erection of $50,000 electric light and water plant.

WASHINGTON, D. C.—The Hill Lighting Company, H. P. Hill, president, has applied for permission to install gas engines and electric lighting apparatus in the Hotel Johnson.

ROCKVILLE, MD.—The Mayor may be addressed concerning construction of waterworks and electric light plant, for which bonds will be issued.

NORRISTOWN, PA.—At a special meeting of the Town Council, held recently, it was decided to build and operate an electric light plant, for the purpose of illuminating the streets of the town.

DAYTON, TENN.—Town Clerk may give information concerning establishment of plant for electric lighting.

THOMASVILLE, ALA.—The Noble gin plant has been purchased by W. I. Waller, of Nicholas, Ala., who will install an electric light plant.

WEST SUPERIOR, WIS.—City Clerk may give information about new lighting plant.

SEGUIN, TEX.—The electric light plant will probably be owned by the city.

Electrical.... Patents.

[Specially reported for this journal by E. S. Duvall, solicitor of patents, Loan and Trust Building, Washington, D. C. Copies of any patent may be secured for 10 cents each.]

ISSUED FEBRUARY 8, 1898.

598,731 Electric railway; M. T. A. Kubierschky, Berlin, Germany.—The combination of one or more electric motors for propelling a car, electric heaters, and a controller having contacts for closing the motor circuit with the heater circuit open and subsequently closing the heater circuit after the motors have attained speed.

598,733 Safety cut-out for electric lamps; A. N. Lovelace, Knoxville, Tenn.

598,853 Electric call-box system; W. T. Budds, Charleston, S. C.

598,864 Electric time switch; G. F. Goodwyn, Arnprior, Canada.—In an electric time switch, the combination with a base, contact plates secured to said base, and a switch lever pivoted to and insulated from the said base; of a clock, a bracket secured to the said clock, a screw through the said bracket to support and adjust the said switch base, means for guiding the said switch base during its adjustment, and means connected with the works of the said clock to press the said switch lever against the said contact plates and to release the same at predetermined times.

ISSUED FEBRUARY 15, 1898.

598,905 Apparatus for electrically measuring temperatures; H. L. Callendar, Montreal, Canada.—In combination with a pyrometer employing a galvanometer placed in a battery circuit and compensating field coils.

598,922 Automatic cut-out for electrical converters; W. J. Greene, Cedar Rapids, Iowa.—The combination with a controller, a switch closer for the primary and secondary circuits, a releaser for the controller switches, and a connection thereof with the said primary and secondary switch closer.

598,926 Box or case for secondary battery electrodes; Geo. W. Harris, New York, N. Y.

598,937 Trolley; C. H. Johnson, Elmhurst, Cal.—A trolley consisting of a trolley wheel carried by a pole, a crank arm journaled on the pole, and a projection on the pole with which the crank arm of another trolley may engage for bridging the first-named trolley to the opposite of the second-named trolley.

598,940 Fusible cut-out; J. Jones, Jr., Brooklyn, N. Y.

598,942, 598,943 Electric arc lamp; G. R. Lean, Cleveland, Ohio.—The combination with the frame of an electric arc lamp, of arms projecting therefrom having openings and a globe for enclosing the arc, supported by said arms and having portions entering said openings and adapted to have play therein.

598,946 Direct-acting oscillating electric motor; J. H. Mason, Brooklyn, N. Y.

598,947 Track bond for electric railways; F. T. Mather, Detroit, Mich.

598,948 Electric battery for medical purposes; C. W. Moessner, Philadelphia.—In a medical battery, the rheostat for controlling the electric currents composed of a series of alternately arranged metallic and composition members, the latter being formed of black lead, or equivalent material, and kaolin, and provided with contacts, and a movable switch adapted to be moved over the contacts.

598,972 Tip for electric conductors; A. B. Blodgett, Lowell, Mass.—An electric conductor, comprising a conductor core, a non-conducting covering and a conducting needle, having a transverse hole, and a fastening passed through said hole to retain said needle in said covering.

599,002 Incandescent lamp; J. T. Lister, Cleveland, Ohio.

599,015 Electric elevators; H. Rowntree, Chicago, Ill.—The combination with a main motor, of an auxiliary motor, means for controlling said auxiliary motor, and means operated by the joint action of the speed of said main and auxiliary motor for controlling said main motor.

599,019 599,020 Automatic railway gate; J. F. Small, Chicago, Ill.

599,032 Electric arc lamp; C. N. Black, New Haven, Ct.—In an arc lamp, a pivotally supported armature carrying a plunger, a dash-pot loosely supported from above in which said plunger works.

599,046 Electric meter; C. Raab, Kaiserslautern, Germany.

599,121 Electric gas lighting apparatus; W. E. Cram, Boston, Mass.

599,162 Electric system of propulsion; W. M. Brown, Johnstown, Pa.—In combination, in an electric railway, of main feeders, in sections detachable connections between adjacent ends of the feeder sections, groups of disconnected contacts corresponding in number to that of the said feeder section, and sub-feeders connecting the individual members of each group with the connected ends of one pair of the feeder sections.

599,186 Electric controller; F. A. Merrick, Auburndale, Mass.

599,274 Trolley pole for overhead electric railways; J. L. Walker, Louisville, Ky.

599,292 Underground conduit for electric wires; A. L. Daniels, North East, Pa.—In a conduit for electric wires, the combination with a metallic pipe, of ends of terra-cotta or like insulating material of like outside and less internal diameter, with said pipe and a lining in said pipe between said ends of insulating material and of like internal diameter.

599,302 Direct current meter; G. A. Scheefer, Peoria, Ill.

599,304 Demagnetizing device; H. A. Storrs, Burlington, Vt.—In an apparatus of the class described, means, including an electro-magnet, to produce an alternating magnetic field, a rotatable carrier having a series of pockets therein, to move the objects to be demagnetized through the magnetic field, and effecting means for automatically effecting removal of the objects from said pockets.

599,305 Electric arc lamp; C. Tepel, Bennett, Pa.

599,307 Trolley actuating switch operating device for electric railways; L. E. Walkins, Springfield, Mass.

ISSUED FEBRUARY 22, 1898.

599,315 Secondary battery; W. A. Crowdus, Chicago, Ill.—The process of forming negative or spongy lead elements in secondary batteries, which consists in immersing plates coated with lead oxide in a solution of sulphate of easily oxidizable metal and sulphuric acid, and passing a current to the plates immersed therein.

599,316 Electric igniter for gas engines; F. E. Culver, Chicago, Ill.—In a sparker for gas engines, the combination of two relatively movable chambered contracting parts adapted to carry the electric current, and means for supplying the chambers of such parts with fluid.

599,322 Individual telephone call; T. C. Drake, Malta, Ohio.

599,344 Electric railway system; J. M. Murphy, Torrington, Ct.

599,346 Electric wire-holding appliance; H. A. McCoy, Cambridge, Mass.—A wire-holding device, consisting of fingers pivoted to each other, provided with means for securing the same to the support and with means for holding the line wire consisting of openings and jaws in the said fingers, the fingers being held open by a spring, and adapted to be depressed by the weight of said line wire and to grip the same.

599,351, 599,352 Electric resistance conductor; H. G. O'Neil, Brookline, Mass.—In a device for interposing a resistance in an electric circuit, the combination of an insulating supporting mold with a resistance conductor of refractory oxide compound cast therein.

599,354 Electric igniter for explosive engines; H. F. Probert, Chicago, Ill.

599,393 Trolley for electric railways; E. K. Landis, Philadelphia, Pa.

599,411 Electrical primary battery; J. B. Whittemore, London, England.—An electric primary battery, consisting of the positive element of iron, an acidulated electrolyte to which coal, prepared by burning thereon, in the open, an inflammable substance is added, and a negative element of the conductive material.

599,480 Electric arc lamp; O. B. Skinner, Cleveland, Ohio.

599,519 Radiator attachment for arc lamps; H. Stenz, Faribault, Minn.

599,553 Telephone switchboard apparatus; C. F. Dunderdale, Chicago, Ill.—A switchboard comprising a hinged lever connected with the subscriber's line and constituting a line terminal, which lever is capable of vertical and lateral movement, terminals for auxiliary circuits adjacent to the lever and means for holding said lever out of use.

599,580 Switch operating mechanism; C. W. Yerbury, Newark, N. J.

599,604 Electric railway system; J. B. Gibbs, Chicago, Ill.—In an electric railway system, the combination with the car, of a supply or line conductor, a series of contact rails arranged in insulated sections and adapted to be enlivened when forced in contact with the line conductor, such rails overlapping at their ends, and a trolley having two contacts, each provided with a double thread.

599,635 Electric arc lamp; H. J. Sage, Rochester, Pa.—In combination with an arc lamp, provided with a carbon socket supported by rods from the base of the lamp and a threaded lower extension; an enclosing casing below the base provided with clips to embrace the rods, a globe, and a globe-holder screwed upon the threaded extension.

599,654 Fire-alarm box; J. H. Hayes, Appleton, Wis.

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REFERENCES: "Electrical Review," New York; Paul Cromlein, Teller Lincoln National Bank, Washington, D. C.; Judge Geo. D. Parker, Berkley, Va.; Second National Bank, Washington, D. C.; E. K. Leech, U. S. Mint, Philadelphia, Pa.; W. F. Newell, Manager and Secretary Water Works, Olympia, Oregon.

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Among the many orders for public telephone exchange equipment recently received by the Stromberg-Carlson Telephone Manufacturing Company, Chicago, was one from Monterey, Mexico, and one from Kaslo, British Columbia.

The number of arc lamps manufactured and shipped from the factories of the General Electric Company within the past fiscal year has exceeded 24,000. Many thousands of the General Electric enclosed arc lamps are now in service, and the introduction of the alternating enclosed lamp has still further increased the sales.

The Imperial Porcelain Works, of Trenton, N.J., have been informed by Mr. P. M. Lincoln, electrical superintendent of the Niagara Falls Power Company, that the recent severe storm had no effect whatever upon that company's transmission line between Niagara Falls and Buffalo. Mr. Lincoln also states that the defective insulators of the "Imperial" type, which have been used on this line since starting it a year ago last November, have been very few, and these became defective from some cause not inherent in the insulator. "Since we have removed from our line all insulators except the 'Imperial,'" says Mr. Lincoln, "the insulator problem has given us practically no trouble whatever. Our second line, built last Fall, was entirely equipped with 'Imperial' insulators."

The Bissell, Dodge & Erner Company, of Toledo, Ohio, has issued the following statement: "The Bissell, Dodge & Erner Company has for three years maintained a branch office at Columbus, Ohio, where the business has assumed proportions that make it desirable to run it as a separate concern. To do this, Mr. John A. Erner has sold his interests in Toledo and purchased the Columbus business entire. Little change will be made in either place except the names, which will be F. Bissell & Company, Toledo, and J. A Erner & Company, Columbus. The affairs of the Bissell, Dodge & Erner Company will be closed up at the Toledo office." The latter company have been agents for the Jandus arc lamp and the D. E. W. incandescent lamp.

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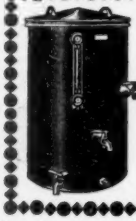

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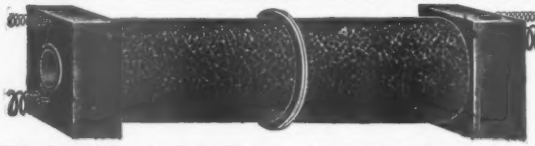

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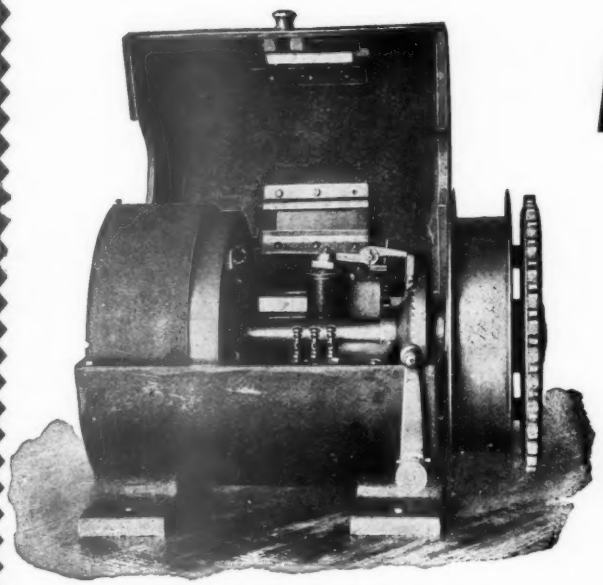

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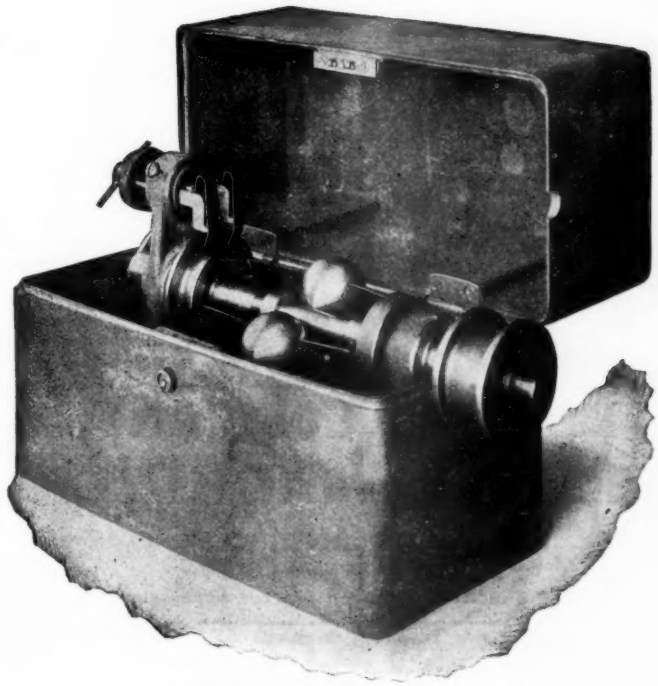

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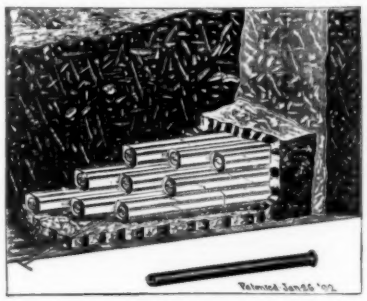

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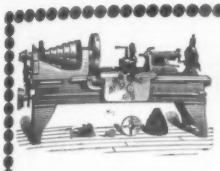

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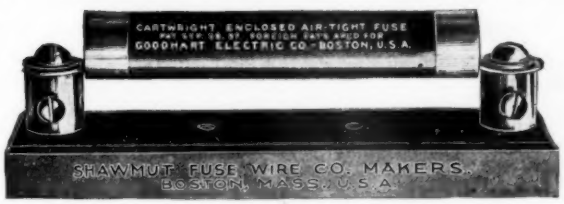

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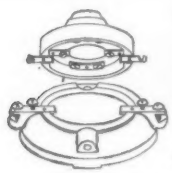

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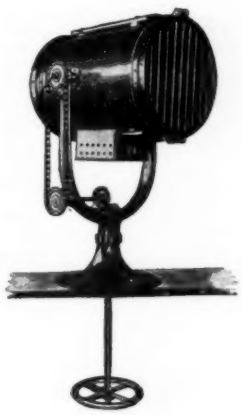

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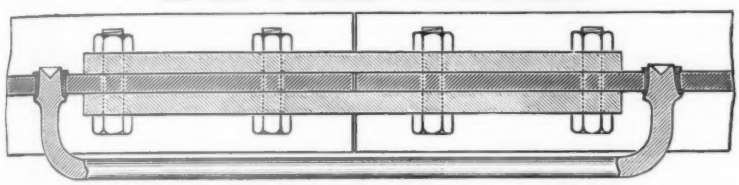

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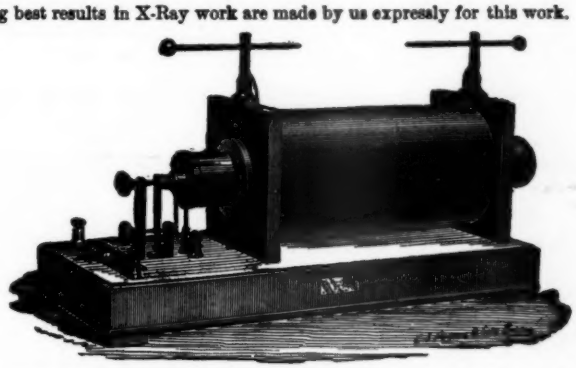

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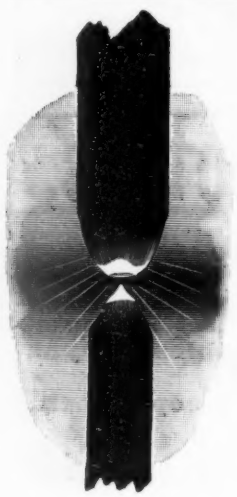

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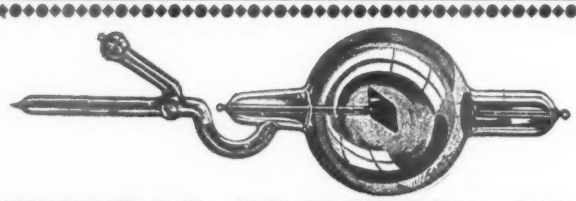

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